THE OFFICINAL

MATERIA MEDICA

BY

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PREFACE TO THE SECOND EDITION.

The issue of another edition of the British Pharmacopœia since this work was first published, has necessitated its complete and thorough revision; and this has entailed not only many changes in details, but also the addition of new drugs, and the omission of some which were formerly officinal, but have now been rejected.

While adhering in the main to the plan of arrangement adopted in the first edition, certain changes have been introduced, which are deserving of notice. Much that was originally arranged in a tabular form has now been incorporated with the general text; and some alterations have been made in the grouping of the drugs. The most important change, however, is that the subject of the action of medicines has been considerably developed. A general summary has been given of the groups under which remedies are classified according to their physiological and therapeutic effects, and the terms associated therewith defined. Moreover, the action of each officinal drug is indicated, either separately, or in connection with

other drugs to which it is therapeutically allied. No attempt is made to discuss their practical uses in disease, which is altogether beyond the scope of this work. The doses of the several preparations are brought together in a concise form, adapted for easy reference.

As this volume now aims at giving a tolerably complete account of the officinal Materia Medica, I have altered its title accordingly. In preparing the present edition I have kept in view, not only the wants of medical and pharmaceutical students, who will find the subject presented from every aspect which can fairly be required at examinations; but also those of practitioners, to whom it may prove useful for reference with regard to many points upon which they may need speedy information.

I desire to thank friendly critics who, either publicly or privately, have pointed out defects in the former edition, and have endeavoured to rectify them where I have thought this desirable. My special acknowledgments are again due to my friend, Mr. Raymond Johnson, who has kindly revised the final proof-sheets.

THE AUTHOR.

102 Harley Street,
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MATERIA MEDICA.

Section I.

INTRODUCTION.

The study of the medicinal agents which are employed in the treatment of disease, constitutes an essential part of a medical education. The subject may be conveniently arranged under four divisions, namely:—I. Materia Medica Proper. II. Pharmacy. III. Physiological Action or Pharmacology. IV. Therapeutics.

Materia Medica has come by general usage to be associated with that branch of the subject which deals with medicinal substances in themselves; that is, with the facts or particulars which have to be learnt about each individual drug. Pharmacy is concerned with the actual preparation of these agents, and of their various combinations and compounds. Physiological Action or Pharmacology refers to the action of drugs upon the system in health. Therapeutics, in the more restricted sense of the term, deals with their effects in disease, and their practical uses in treatment.

The main purpose of this work is to give a concise account of Materia Medica and Pharmacy, according to a plan which I have found useful for practical instruction. The Physiological and Therapeutic Action of the several drugs will also be stated, so far as this is indicated by the terms in recognised use—*emetic*, *purgative*,

tonic, *diuretic*, *etc.*; and the doses of medicines or their preparations employed for internal administration will be mentioned. With regard to Practical Therapeutics, however, it is useless to attempt to teach this branch of the subject to those who have not as yet acquired the preliminary knowledge, without which its intelligent study is absolutely impossible. Therefore, no allusion will be made in the following pages to the uses of drugs in disease, and I would strongly warn beginners against burdening their memory with details on this point, the meaning of which they cannot possibly appreciate or understand.

I. Method of Study.

It is preferable to recognise Materia Medica and Pharmacy as distinct branches, and to study them separately. Obviously Materia Medica should come first. The student should avoid burdening his memory with minute and unimportant details about the various drugs, but endeavour to grasp the essential facts relating to each, and to recognise intelligently their practical bearings. The requisite information must of course be obtained from books, lectures, or demonstrations, but these methods of instruction should always be supplemented by personal and practical study of the drugs themselves. Thus, in reading the description of a drug, the different points will be far more easily understood and remembered, if the student has a specimen before him, and carefully observes the characters which are described. Moreover, by examining and handling the specimens again and again, he will make himself familiar with these characters; and

may also learn to contrast those drugs which are liable to be mistaken for each other. Again, he should endeavour to practise and verify chemical tests, where these are important, so as to have them impressed on the memory. Nor should the study of Medical Botany be forgotten, in so far as this subject is connected with Materia Medica; while useful information may be gained by observing the plants themselves in their natural state, when this is practicable.

Pharmacy is essentially practical, and a satisfactory and abiding knowledge of its details can only be acquired by learning the "art of dispensing." Formerly this branch was taught during the period of apprenticeship, but now it has to be studied as a separate part of the medical curriculum, either in a private or public dispensary. It must be insisted upon that *practical pharmacy is important*, and should receive adequate attention. While during the long apprenticeships it occupied far too prominent a position, the danger now is lest students should pass into the opposite extreme, and go through the instruction demanded by the examining boards in a perfunctory manner, as if it were of no consequence. Obviously a practical knowledge of pharmacy is absolutely essential for those who intend to engage in a dispensing practice; and it is very useful even to those who have no such intention. Thus it teaches them, and makes them familiar with :—(1) The *art of prescribing*, *i.e.*, how to write prescriptions, and the best combinations of different drugs to employ. (2) The *modes of administering and using* therapeutic agents. (3) The proper *doses* of drugs under various circumstances. (4) *Incompatibles*, *i.e.*, the medicines which are incompatible with each other, and which should not be employed together. Incompatibility may be either *chemical* or *physiological*,

and it is of considerable importance to become acquainted with, and to remember, the chief facts relating to this subject. Owing to their incompatibility drugs when combined together may give rise to compounds which are either inert or injurious; or which are merely objectionable on account of their appearance, colour, taste, or other characters. It must be borne in mind, however, that agents which are chemically incompatible may have valuable therapeutic properties; as may be exemplified by Lotio Nigra, Mistura Ferri Composita, and numerous other combinations.

While Pharmacy is essentially practical, its study may be guided and assisted by books. *The book* which must be regarded as the standard of Pharmacy in this country is the British Pharmacopœia; but other countries have their several Pharmacopœias, which may be studied with advantage; while most hospitals have now their special Pharmacopœias, from which much valuable information may also be gained; and there are several useful books of prescriptions compiled by individual writers. In studying the British Pharmacopœia with reference to Pharmacy, attention must be directed to the following points:—1. The *weights* and *measures* which are employed, with their signs and abbreviations. 2. The mode of conducting *general pharmaceutical operations*. 3. The nature of *groups of preparations*, and their general methods of manufacture. 4. The details of the preparation of *individual drugs* and of *active principles*. 5. The *pharmaceutical compounds* or *officinal preparations* of each particular drug, with their important ingredients, and in some instances the proportions of these ingredients. 6. The *members of each group* of officinal preparations; with such details as may be of importance in relation to any individual member of the group.

2. General Nature and Sources of Drugs.

The agents which are used as medicines must be regarded in the first instance under the two divisions of:—1. *Officinal* or *official*; 2. *Non-officinal* or *non-official*. *Officinal* or *official* drugs are those which are recognised by the British Pharmacopœia, and this division alone will be dealt with in this work; although there are many *non-officinal* agents which have obtained an established reputation in treatment, and which are of considerable practical value.

The following table will serve as a basis for indicating generally the sources and nature of medicinal agents:—

A. Inorganic Kingdom	1.	**Non-metallic.**
	2.	**Metallic.**
	3.	**Special chemical products.**
B. Organic Kingdom	4.	**Vegetable** or **Botanical.**
	5.	**Animal.**

1. Some important drugs belong to the **non-metallic** division of chemistry, such as certain gases, carbon, sulphur, iodine, phosphorus, and some acids.

2. The **metallic** division yields a large number of valuable substances, preparations of several of the metals being extensively employed in treatment. They are sometimes used as found in nature, especially in the form of *mineral waters*. Some salts are also obtained ready formed, and have only to be purified for use. As a rule, however, metallic preparations have to be specially made, in the form of oxides, salts, acids, and various other combinations. Very rarely is a metal itself employed therapeutically.

3. Under **special chemical products** I include certain compounds which belong to the domain of *organic chemistry*, and which are made up of some of the non-metallic elements in various combinations. Alcohol, the different ethers, and hydrocyanic acid will serve to illustrate this group.

4. From the **vegetable** or **botanical** kingdom a very large number of drugs are obtained, many of them of the greatest value and importance. In a few instances the *entire plant* is made use of; but commonly one or more of its *parts* are alone official, such as the root, bark, wood, leaves, flowers, fruit, or seeds. Two drugs derived from the vegetable kingdom are really portions of plants in a *diseased* condition, namely, ergot of rye and gall-nuts. Plants are seldom administered in their natural state, but are usually made into different *pharmaceutical preparations*. Again, several important drugs consist of *products* obtained from certain parts of plants, by incision or in other ways, of which opium, aloes, scammony, asafœtida, camphor, catechu, and kino afford prominent examples. These are often given in their *simple* state, but in reality they are *compound* agents, and contain *active principles* and other constituents, sometimes in considerable number, and having very different actions, which can be separated from each other, and are frequently used for their individual effects. Some of these active principles have been prepared artificially, in the chemical laboratory; while others can be so modified by chemical processes, as to yield products essentially different in their action upon the system, although their chemical composition may be but very slightly altered.

The **active principles** derived from the vegetable kingdom present much variety, and they belong to the following groups:—

a. Alkaloids, which are as a rule most valuable agents, and often extremely powerful. *Ex.* Morphine, quinine, strychnine, atropine.

b. Neutral principles. These are usually bitter, and some are very useful in treatment, but others are almost inert. *Ex.* Meconin, calumbin, elaterin.

c. Organic acids. Ex. Citric, tartaric, malic, oxalic, tannic and gallic (which are very extensively found in the vegetable kingdom), meconic.

d. Oils, including (i) *Fixed oils*, such as linseed, olive, castor, and croton oils; and (ii) *Volatile or essential oils*, as oils of rue, lavender, peppermint, and mustard.

e. Gums. These are of two kinds, namely, (i) *Arabine*, which is soluble in water; (ii) *Tragacanthine* or *Bassorine*, which swells up in cold water.

f. Resins and their varieties. These include, (i) *Simple resins, e.g.*, guaiacum, mastiche. (ii) *Gum-resins, e.g.*, myrrh, asafœtida, ammoniacum, scammony. (iii) *Oleo-resins* or *Terebinthinates, e.g.*, copaiba, turpentine, Canada balsam. (iv) *Balsams*, consisting of resin and benzoic or cinnamic acid, *e.g.*, benzoin, balsam of Peru, and balsam of Tolu.

g. Starch and *Saccharine elements.*

h. Vegetable jelly, pectin, and *pectic acid.*

i. Protein or *Albuminoid substances*, including *vegetable albumin, fibrin, casein*, and *gelatine.*

j. Extractive matters. These are principles the nature of which is not definitely known, and which are provisionally grouped together under this term. Their number is becoming progressively less, as researches reveal more clearly what the active principles of plants really are.

k. Inorganic salts. Most plants contain inorganic constituents, and these may be of more or less importance, especially salts of the alkalies and lime. Rhubarb contains a considerable quantity of oxalate of lime.

It will be readily understood that the different groups of active principles just indicated are very variously combined in different plants or parts of plants which are employed medicinally. Moreover, they differ greatly in their power and effects upon the system, and in their therapeutic value. It may also be mentioned here that some plants contain elements having no obvious physiological action of importance, but when these elements are brought into contact with water, a chemical decomposition takes place, which results in the production of very powerful agents. This is illustrated by oil of bitter almonds, and oil of mustard.

5. From the **animal kingdom** only a comparatively few therapeutic agents are obtained, and they may be arranged as follows:—

a. Animals themselves. *Ex.* Cantharides, cochineal, leeches.

b. Parts of Animals, altered or prepared in some way. *Ex.* Isinglass, lard, suet, cetaceum.

c. Secretions. Ex. Musk, honey.

d. Special preparations obtained from organs or secretions. *Ex.* Cod-liver oil, pepsin, ox-gall, milk-sugar, wax.

e. Eggs. The white and yolk of hens' eggs are used medicinally.

3. General Scope of Materia Medica.

It will perhaps help to make the subject more clear, to point out definitely what Materia Medica actually includes; or, in other words, what it may be necessary to learn about any individual drug. Of course there are great differences in this respect as regards different drugs, some being quite unimportant, and all that is required is that the student

should know what they are, and should be able to recognise them when he sees them; while in other instances more or less numerous details have to be acquired, which are of real consequence. The facts which it may be requisite to learn about a drug may be thus summarised:—

a. Its *officinal source,* that is, whence it is derived. In the case of drugs obtained from the vegetable kingdom, their *botanical* and *geographical* source must be separately distinguished.

b. Its *nature,* or what class of substances it belongs to. In relation to the vegetable drugs, it is requisite to learn what part or parts of a plant are officinal, as well as the nature of any special product obtained from this kingdom.

c. Its *mode of preparation.* This includes not only the more or less complicated chemical processes by which salts and numerous other medicinal substances are made; but also the methods by which certain drugs are procured in their natural state, or the treatment to which they are subjected afterwards, in order to render them fit for use.

d. Its *active principles* or *chemical composition.* The great majority of drugs are more or less complex, and their more important constitutents ought to be known. Thus, the active principles which the officinal part or parts of a plant contain, and to which they owe their therapeutic efficacy, should be learnt; as well as those of vegetable and animal products. Moreover, it is requisite to be acquainted with the chemical composition or *formula* of the various metallic and other salts or compounds; and with the elementary constitution of the more important organic preparations and principles, such as, ether, tannin, or morphine.

e. Its *chief characters* and *properties.* These include, in the first place, the more obvious characters by which a drug is recognised, and by which

it is at once distinguished from all others; and, secondly, the more minute physical and chemical properties which many drugs present, and which have to be ascertained by more or less elaborate investigation. These may explain their therapeutic usefulness; but from a Materia Medica point of view they are important, inasmuch as they enable substances to be distinguished from each other which cannot be otherwise separated. It may be mentioned here that some medicines present important *varieties*, with the distinctive characters of which it is necessary to be acquainted, such as cinchona, senna, aloes.

f. Its *tests*, *impurities*, and *adulterations*. The tests of a drug are scarcely separable from its other properties, so far as its mere recognition is concerned; but they are also applied in the B.P. to determine its strength and purity. Unfortunately even medicines are liable to be impure or adulterated, either from accident or design, and it is essential to know what impurities or adulterations must be looked for in connection with many of the more important drugs, and how they are to be severally recognised and detected. In some cases their detection is quite easy; but in others skilled investigation is required, which it is quite beyond the power of the student to carry out.

4. Pharmacy.

A. Pharmacopœial or Galenical Preparations.

Having already indicated what the study of Pharmacy includes, it will now be convenient to give an outline of the **groups of preparations** re-

cognised by the British Pharmacopœia, sufficient to enable the student to understand their general nature and uses; and to obtain a concise knowledge as to how they are made. The officinal preparations of **particular drugs** will be considered under their respective headings; and the **members of the different groups** will also be subsequently enumerated. The preparations are here taken in alphabetical order.

I. ACETA — VINEGARS. Excluding *Acetum* or *vinegar*, the preparations thus named are solutions of the active principles of certain drugs in either *strong* or *dilute acetic acid*, with or without the aid of heat.

II. AQUÆ—WATERS. In addition to *Aqua* or *water*, preparations included under this group are of three kinds, namely:—

1. *Aqua Destillata*, or water distilled from its ordinary impurities.

2. *Solutions* of certain substances in distilled water.

3. Preparations made by *distilling* water with parts of plants containing *volatile oil*, or with the volatile oil itself, by which process some of the oil passes over in solution.

III. CATAPLASMATA—POULTICES. Soft and moist preparations, for external and local application. They consist of:—1. The *liquor*, which is usually boiling water; 2. The *corpus* or *basis*, generally linseed-meal, exceptionally bread or flour; 3. The *accessorium* in most instances, which is an additional medicinal agent, intended to produce particular therapeutic effects. The ingredients are mixed in different ways.

IV. CHARTÆ—PAPERS. Special preparations on paper, intended for external use. There are only two in the Pharmacopœia, and each is prepared in a particular way.

V. Confectiones—Confections. Soft, but more or less consistent substances, intended for internal administration, or for forming the basis of pills. They consist of drugs incorporated with *saccharine* substances, these being used either for the preservation of the drugs, or for rendering them more palatable. Confections are prepared in a variety of ways; and the saccharine material is either *refined sugar, syrup*, or *honey*.

VI. Decocta—Decoctions. Solutions of the active principles of vegetable drugs, obtained by *boiling the ingredients in water* contained in a covered vessel. The principles to be dissolved must be non-volatile. The substances are directed to be used in different instances either whole, or in chips, bruised, sliced, or powdered. There are exceptions in details in making decoctions, but as a rule the ingredients are directed to be boiled for *ten minutes;* to be *strained while hot;* and as much distilled water to be poured over the contents of the strainer, as will bring the whole up to *one pint*. With two exceptions, all the officinal decoctions are practically *simple*.

VII. Emplastra—Plasters. Preparations intended for external application. They are made in various ways, but consist essentially of combinations of substances spread out on some firm material, such as calico or leather, and which are adhesive at the temperature of the body. These substances are *oleo-margarate of lead* (*lead plaster*), *resin*, *wax*, *oleaginous* or *fatty compounds*, and *soap*, often variously combined; and with these are mixed, in several instances, *medicinal* agents of a more or less powerful nature.

VIII. Enemata—Injections or Clysters. Liquid preparations intended to be injected into the rectum. Their basis is, with one exception, *mucilage of starch*.

IX. Essentiæ—Essences. Solutions of a *volatile oil* (one part) in *rectified spirit* (four parts).

X. Extracta—Extracts. In general terms an extract may be defined as a concentrated preparation containing the active principles of a vegetable drug, obtained by evaporating the juice of plants, or solutions of their principles in different menstrua, and in some instances submitting the products to certain processes in order to preserve them. Extracts are of various degrees of consistence, and have on this ground been divided into *fluid*, *semi-solid*, and *hard* or *dry*. The more practical and useful arrangement of these preparations, however, is as follows :—

A. **Fresh** or **green extracts.** This class of extracts are usually prepared thus :—1. *Press the juice* out of the leaves or other fresh parts of plants, differing in different cases. 2. Heat this juice gradually to 130° to *coagulate the green colouring matter*; separate this by a calico filter; heat the fluid to 200° to *coagulate the albumen*, and again filter. 3. Evaporate the filtrate by a water-bath to the consistence of a thin syrup; add the green colouring matter previously separated, and pass through a hair sieve; and, stirring the whole together assiduously, continue the evaporation under 140° to a suitable consistence for forming pills.

The fresh extracts of colchicum and taraxacum are exceptional. There are differences in detail in each case, but practically the juice, pressed from the corm and root respectively, is heated at once to 212° to coagulate the albumen; this is separated by straining; and the fluid is evaporated under 160° to a suitable consistence. There is also an *acetic extract* of colchicum, made on the same plan, with the aid of acetic acid.

B. **Aqueous extracts.** These are prepared by acting upon either a part of a plant, or a vegetable

product, by *distilled water;* and evaporating the fluid to a suitable consistence. The process of abstraction is carried out in different ways in different cases, namely, by :—

1. Digestion in boiling water.
2. Infusion in boiling water, and subsequent boiling.
3. Decoction or boiling.
4. Digestion in cold water.

C. **Alcoholic extracts.** In this class of extracts the active principles of the drug are dissolved out either by *rectified spirit* alone ; *rectified spirit* and *cold* or *boiling water* used separately; *proof spirit;* or *proof spirit* and *water.* The details of the process differ considerably in the case of individual extracts. The solutions are then evaporated to a proper consistence.

D. **Ethereal extracts.** *Ether* is used for the purpose of *dissolving out oil* from one drug (stramonium seeds), before preparing its extract; in two instances it is employed as the *solvent,* in one case alone, in the other after the action of rectified spirit.

E. **Liquid extracts.** These are characterised by being of a *fluid* consistence.

Most of the liquid extracts are made by abstracting the active principles by means of *water;* evaporating to a certain quantity; and adding *rectified spirit.* In one instance (cinchona) *hydrochloric acid* and *glycerine* are added to the water. *Rectified spirit* alone, *proof spirit,* and *proof spirit* and *water,* are used in particular cases. One of the ethereal extracts belongs to the liquid group. Two of the liquid extracts are made from other extracts.

With one exception the extracts are all *simple.*

XI. Glycerina—Glycerines. Solutions of drugs in *glycerine,* the process of solution being generally aided by heat.

XII. INFUSA—INFUSIONS. The chief facts relating to these preparations may be thus summarised:—

1. They are made by *infusing* or *digesting* drugs in distilled water, in a covered vessel.

2. The substances employed are, as a rule, either *bruised, sliced, cut small,* or *powdered* before being infused. The quantities are variable.

3. *Boiling water* is used, with four exceptions; in two instances *cold water* is employed, and in the other two *water at* 120°. The quantity ordered is *ten fluid ounces.*

4. The *time* for infusion varies according to the solubility of the active principles of the drug, being either fifteen minutes, half an hour, one hour, or two hours in one case.

5. In every instance except one, the infusion is directed to be *strained* before use.

6. With few exceptions the infusions are quite *simple.*

XIII. INJECTIONES HYPODERMICÆ—HYPODERMIC INJECTIONS. This class of preparations consists of *concentrated solutions* of powerful drugs, which are intended for *subcutaneous injection.*

XIV. LAMELLÆ—DISCS. These are a group of preparations introduced into the recent edition of the B.P., and defined as "discs of gelatine, with some glycerine, each weighing about $\frac{1}{50}$ grain, and containing . . . . a definite proportion of the active drug in each case." No instructions are given as to the mode of preparation.

XV. LINIMENTA—LINIMENTS or EMBROCATIONS. These preparations are characterized as follows:—

1. They are intended for *external* use, being applied to the skin, usually with the aid of friction.

2. Most of them are of more or less *oily consistence,* and they have been designated "very thin ointments." They all contain either a *fixed oil,* a

volatile oil, a *concrete oil* (camphor), *glycerine*, or a *soap*, several of them having two or more of these in combination; some liniments also contain *rectified spirit*.

3. Some liniments are quite *simple*, others are *compound;* and the simpler liniments form the basis of some of the more complex, active ingredients being added, intended to produce special effects.

4. The exact *mode of preparation* varies, but in many instances it is a mere mixing together of the ingredients.

XVI. Liquores—Solutions. It is difficult to give any general account of these preparations, as they are very numerous, and present considerable variety. They must, therefore, be studied mainly individually or in groups. They are, with few exceptions, *solutions* of drugs, solid, liquid, or gaseous, in water: or *dilutions* with water. In some instances *acids* or other ingredients are employed to aid solution. *Hydrochloric acid*, *camphor water*, *acetic ether*, *chloroform*, and *ethylic alcohol* are severally used as solvents in particular instances. In one group *rectified spirit* is added to prevent decomposition. The different solutions are prepared in various ways, the process of dissolving being often aided by heat, pressure, and other methods.

XVII. Lotiones—Lotions. These are external applications of a liquid character, and such preparations, of a non-officinal kind, are often employed. In the B.P., however, there are but two recognised—*Lotio Hydrargyri Nigra* and *Lotio Hydrargyri Flava*, which are respectively precipitates of *mercurous* and *mercuric oxide* with *lime-water*.

XVIII. Mellita—Honeys. Preparations including *Mel Depuratum—purified* or *clarified honey;* and *Mel Boracis*, in which borax is mixed with purified honey. Honey is also an ingredient in the *Oxymels*.

XIX. Misturæ—Mixtures. This is another group of preparations of which no very definite general description can be given, and each of its officinal members must be separately studied. The following are the chief general points:—

1. Mixtures are for *internal* administration.

2. Some are *simple*, but several are of *complex* composition.

3. They consist mainly of substances *suspended*, partly *dissolved*, in water, cinnamon-water, peppermint-water, rose-water, or milk; and agents are sometimes used to aid solution. Some mixtures are merely *solutions*. Infusion of Senna forms the basis of the Mistura Sennæ Composita.

4. The agents used to suspend the drugs are either *syrup, sugar, yolk of egg*, or *gum*. When the drugs suspended are oils or resins, an *emulsion* is formed, and a gum-resin forms such an emulsion without further aid.

5. In some instances ingredients for *flavouring* are added to mixtures.

XX. Mucilagines—Mucilages. Solutions of *gummy substances* in water; or *starch boiled* so that it is in a "state of excessive hydration." A small proportion of rectified spirit is added to the Mucilago Tragacanthæ, in order to preserve it. The mucilages are of more or less thick consistence.

XXI. Olea—Oils. These preparations will be more conveniently discussed hereafter. In the meantime it will suffice to state that the officinal oils may be arranged under the following groups, as regards their mode of preparation:—

1. Oils obtained by *distillation*.

2. Oils obtained by *expression*, sometimes aided by *heat*.

3. Oil extracted by *heat* alone (Cod Liver Oil).

4. *Solution* of a drug in oil (Phosphorated Oil).

XXII. Oleata—Oleates. This is a new class of preparations, introduced into the recent edition of the B.P. They are direct combinations of certain drugs with *oleic acid.* One of the oleates is made into an ointment.

XXIII. Oxymellita—Oxymels. A mixture of *clarified honey* with *acetic acid* (*Oxymel*); or with *acetum scillæ* (*Oxymel scillæ*).

XXIV. Pilulæ—Pills. In this class of preparations a more or less consistent mass or *bolus* is first made, and this is divided into *pills* of suitable size, or according to the dose required. The officinal pills are numerous, and it is important to know their chief ingredients, and in some instances to remember their proportions.

The following general facts may be noted and remembered:—

1. Pills are for *internal* administration.

2. Most of them are of *complex* constitution, and many contain several active drugs. Some ingredients, however, are merely intended to subdivide conveniently the dose of the more active drugs, or to give the bolus a suitable consistence.

3. In their *preparation* the rule is to powder the solid ingredients, and then to thoroughly mix them and the other ingredients with some cohesive material, so as to form a uniform consistent mass. The materials used for this purpose are chiefly *treacle, hard soap,* and *confection of roses;* exceptionally *syrup, glycerine, curd soap, water,* or *castor oil.* Some pills are made in a special manner, and these have to be separately studied.

XXV. Pulveres—Powders. These scarcely need any definition, and only call for brief notice.

1. They are all more or less *complex,* their ingredients being in most instances all active drugs, but in some cases certain constituents are only used to promote the minute division or intermixture of the more active medicines.

2. They consist of *finely-powdered solids*, the general directions as to their preparation given in the B.P., with a few exceptions, being:—"Mix them thoroughly, pass the powder through a fine sieve, and finally rub it in a mortar. Keep it in a stoppered bottle."

XXVI. SPIRITUS—SPIRITS. The preparations thus named may be divided into three groups, namely:—

1. The *alcoholic* group.

2. *Solutions* of various agents in, or *mixtures* with *rectified spirit*, such as camphor, volatile oils, ether, and chloroform.

3. *Special preparations*, of a more or less complex nature, made by a process of distillation.

XXVII. SUCCI—JUICES. There are two groups of juices officinal, namely:—

1. The *freshly expressed juices* of certain ripe fruits.

2. *Juices specially prepared*, by pressing them out of fresh bruised plants; adding one measure of *rectified spirit* to every three measures of juice, to preserve it; setting aside for seven days; filtering; and keeping in a cool place.

XXVIII. SUPPOSITORIA—SUPPOSITORIES. The following points may be noted with reference to this class of preparations:—

1. They are of somewhat *solid* consistence, but capable of melting at a moderate heat, or of being dissolved; and are made into *small moulds*, of a conical or other suitable shape, for introduction into the rectum.

2. Each suppository contains one or more important *active ingredients*, of which the proportions must be learnt.

3. They are prepared in two ways, namely:—

a. Rub the active ingredient or ingredients with *oil of theobroma* in a slightly warmed mortar, and add them to oil of theobroma previously melted at a

low temperature; mix the whole thoroughly, and pour the mixture while it is fluid into suitable moulds of the capacity of 15 grains; or the fluid mixture may be allowed to cool, and then be divided into twelve equal parts, each of which shall be made into a conical or other convenient form for a suppository. (The proportions used differ in different cases).

b. Mix the active ingredients with *glycerine of starch* and *curd soap* in certain proportions; in some instances add *starch* to form a paste of suitable consistence; divide into 12 suppositories.

XXIX. SYRUPI—SYRUPS. These are liquid preparations for *internal administration*, useful on account of their sweet and pleasant taste, due to their saturation with *sugar*, which also serves usually for their preservation. They may be classified according to the following groups:—

1. *Simple syrup*, which is a solution of refined sugar in water in certain proportions.

2. Syrups made by *mixing simple syrup* with certain *tinctures;* or by *dissolving* a drug in a mixture of *syrup* and *water*.

3. Syrups made from refined sugar and various drugs by *special processes*, sometimes very complicated. In this group either *cold distilled water*, *boiling water*, *rectified spirit*, or *rectified spirit* and *water*, are generally used as solvents. There are two exceptions, in one case the sugar being merely dissolved in *acetum scillæ* (*Syrupus scillæ*); in the other in *lemon-juice* (*Syrupus limonis*), but here *lemon-peel* is also used.

Syrups should be kept in *full bottles*, else the sugar is liable to crystallize. If they contain too little sugar, they are apt to ferment. Their preservation is aided in some instances by certain special precautions.

XXX. TABELLÆ—TABLETS. A newly introduced group, of which there is only one member at present—Tabellæ Nitro-glycerini, defined as "Tablets of chocolate each weighing two and a half grains, and containing one-hundredth of a grain of pure nitro-glycerine."

XXXI. TINCTURÆ—TINCTURES. This is a very numerous class of preparations, and they present considerable differences. The following are the general points to be noted:—

1. Tinctures are *solutions* of drugs or active principles in menstrua of a *spirituous* nature, either because these substances are not soluble in water, or because the aqueous solutions are unstable, and decompose more or less readily.

2. They are either *simple* or *compound*, the latter containing several ingredients usually. Some constituents are used merely for their taste, for suspending other drugs, or for other special purposes.

3. The solvents employed in different instances are:—

a. Rectified spirit, chiefly used in the case of drugs which contain much *resin* or *volatile oil;* or this spirit with a certain proportion of water.

b. Proof spirit, when the principles are partly soluble in water, partly in spirit. This is the menstruum most frequently used.

c. In exceptional cases *aromatic spirit of ammonia; strong solution of ammonia* with *rectified spirit; solution of ammonia* with *proof spirit; spirit of ether; tincture of orange peel; tincture of cardamoms* with *rectified spirit;* and a mixture of *chloroform*, *ether*, and *rectified spirit*.

4. Solid drugs made into tinctures are usually directed to be *cut small*, *bruised*, or *powdered*, before being acted upon by the menstruum.

5. The methods employed in preparing tinctures may be indicated as follows:—

a. Simple mixture or *solution.*

b. Maceration for seven days, with occasional agitation, in a closed vessel; then filtering, and in many cases pressing and straining; and finally adding sufficient spirit to make *one pint.*

c. Percolation alone in one instance.

d. Maceration for forty-eight hours in fifteen ounces of spirit, in a closed vessel, agitating occasionally; followed by *percolation* with additional five ounces. Afterwards subject the contents of the percolator to pressure, filter the product, mix the liquids, and add sufficient spirit to make *one pint.*

e. Special processes.

XXXII. Trochisci—Lozenges. The points to be noted about these preparations are as follows:—

1. They are *small solid tablets* intended to be sucked, and are a convenient form of administering drugs in small doses, or such as have not a disagreeable taste.

2. Most of them are *simple*, a few *compound.*

3. It is important to learn the *proportions* of the *active drugs* in each lozenge.

4. They are chiefly made up with *refined sugar, gum acacia, mucilage,* and *water;* some contain also *tincture of Tolu. Extract of liquorice* is used in one instance instead of mucilage; and in another case *rose-water* instead of water.

5. The usual *method of preparation* is to "mix the dry ingredients, and add mucilage and water to form a proper mass. Divide into 720 lozenges, and dry these in a hot-air chamber with a moderate heat." Some lozenges are prepared in a *special* manner.

XXXIII. Unguenta—Ointments. The main facts relating to ointments may be thus summarized:—

1. They are of a *soft* but more or less *solid* consistence; and are intended for *external* use, being smeared over a surface, applied on lint or other material, or rubbed in.

2. They consist of *fatty* or *unctuous* substances, either *simple*, or *mixed* with various *active drugs*.

3. The *materials* employed in making ointments in different cases are :—

a. Prepared lard.

b. Benzoated lard.

c. Prepared lard and suet.

d. Prepared lard and olive oil.

e. Prepared lard and yellow wax.

f. *Simple ointment*, which consists of a mixture of benzoated lard, white wax, and almond oil.

g. White or yellow wax and oil.

h. Yellow wax alone.

i. Spermaceti, white wax, and almond oil.

j. Soft and hard paraffin.

4. The *methods of preparation* are very diverse, but they may be thus classified :—

a. *Simple trituration* and thorough *mixing* of the ingredients.

b. *Dissolving* the active drugs in, or mixing them with, spirit, water, nitric acid, oil, or other liquids, before mixing them with the firmer constituents.

c. *Melting* wax, resin, concrete oils, fats, or paraffins, by means of a *gentle heat* (usually in a water-bath); then stirring thoroughly and constantly while cooling, and at the same time incorporating the dry ingredients in fine powder.

d. *Melting* the ingredients together; and either stirring while cooling; or straining through calico, flannel, or muslin.

e. *Special methods*.

XXXIV. Vapores—Inhalations. These are preparations intended to be inhaled by the patient, usually by means of a suitable "Inhaler." Those which are officinal are each prepared in a particular way, and must be separately studied.

XXXV. Vina—Wines. Excluding *Vinum Xericum* or *Sherry wine*, the following general facts may be noted about these preparations :—

1. They are *solutions* of drugs or active principles in *wine*, which is employed partly on account of its alcohol, partly in some cases on account of its acid. Most are *simple*, a few *compound*.

2. The *solvent* is *sherry wine* in all but three instances. *Vinum Aurantii* is merely a fermenting saccharine solution, to which fresh peel of bitter orange has been added. This wine is used in the preparation of two others; in one *citric acid* being also added to aid solution.

3. The *methods of preparation* are:—

a. Usually by *maceration;* pressing and straining when required; and filtering.

b. Mere *solution* and filtering in some cases.

c. *Special*, in the case of Vinum Ipecacuanhæ.

B. Weights and Measures.

It is necessary to be acquainted with the recognised weights and measures, and it will be convenient to give here a complete summary of this part of the subject, copied from the *Appendix* of the B.P.

WEIGHTS AND MEASURES OF THE BRITISH PHARMACOPŒIA.

Weights.

1 Grain	gr.		
1 Ounce (Avoir.)	oz.	=	437·5 grains
1 Pound	lb. = 16 ounces	=	7000 ,,

Measures of Capacity.

1 Minim	min.		
1 Fluid Drachm	fl. drm.	=	60 minims
1 Fluid Ounce	fl. oz.	=	8 fluid drachms
1 Pint	O.	=	20 fluid ounces
1 Gallon	C.	=	8 pints

Measures of Length.

1 inch	in.	
12 inches	= 1 foot	
36 inches	= 3 feet	= 1 yard

Relation of Measures to Weights.

1 Minim	is the measure of	0·9114583	grains of water
1 Fluid Drachm	,,	54·6875	,,
1 Fluid Ounce	,, 1 ounce or	437·5	,,
1 Pint	,, 1·25 pound or	8750·0	,,
1 Gallon	,, 10 pounds or	70000·0	,,

WEIGHTS AND MEASURES OF THE METRIC SYSTEM.

Weights.

1 Milligramme	= the thousandth part of one grm. or	0·001	grm.
1 Centigramme	= the hundredth ,,	0·01	,,
1 Decigramme	= the tenth ,,	0·1	,,
1 Gramme	= weight of a cubic centimetre of water at 4° C.	1·0	,,
1 Dekagramme	= ten grammes ,,	10·0	,,
1 Hectogramme	= one hundred grammes ,,	100·0	,,
1 Kilogramme	= one thousand grammes ,,	1000·0	,,

Measures of Capacity.

1 Millilitre	= 1 cub. centim. or the mea. of	1	gram. of water	
1 Centilitre	= 10 ,,	10	,,	,,
1 Decilitre	= 100 ,,	100	,,	,,
1 Litre	= 1000 ,,	1000	,,	(1 kilo.)

Measures of Length.

1 Millimetre	= the thousandth part of one metre or	0·001	metre
1 Centimetre	= the hundredth ,,	0·01	,,
1 Decimetre	= the tenth part ,,	0·1	,,
1 Metre		1·0	,,

Relation of the Weights of the British Pharmacopœia to the Metric Weights.

1 Pound	=	453·5927	grammes
1 Ounce	=	28·3495	,,
1 Grain	=	0·0648	,,

Relation of Measures of Capacity of the British Pharmacopœia to the Metric Measures.

1 Gallon	= 4·543458	litres	
1 Pint	= 0·567932	,, or 567·932	cubic centimetres
1 Fluid Ounce	= 0·028397	,, 28·397	,,
1 Fluid Drachm	= 0·003550	,, 3·550	,,
1 Minim	= 0·000059	,, 0·059	,,

Relation of the Metric Weights to the Weights of the British Pharmacopœia.

1 Milligramme	=	0·015432 grains
1 Centigramme	=	0·15432 ,,
1 Decigramme	=	1·5432 ,,
1 Gramme	=	15·432 ,,
1 Kilogramme = 2 lbs. 3 oz. 119·8 grs. or 15432·349		,,

Relation of the Metric Measures to the Measures of the British Pharmacopœia.

1 Millimetre = 0·03937 inches
1 Centimetre = 0·39371 ,,
1 Decimetre = 3·93708 ,,
1 Metre = 39·37079 ,, or 1 yard 3·37 inches
1 Cubic Centimetre = 15·432 grains*
1 Litre = 1·76077 pint or 1 pint 15 oz. 1 dr. 43 m.

In prescribing, the following signs are commonly and legitimately used:—

℥ = Minim;
ℨ = Scruple or 20 grains;
ʒ = Drachm or 60 grains;
℥ = Ounce.

* The cubic centimetre is a standard at 4° C. (39°·2 F.), the grain at 62° F. (16°·66 C.)

C. Pharmaceutical Operations.

It will be expedient to define here more clearly some of the more important operations or processes connected with pharmacy, which have either been alluded to in discussing the groups of officinal preparations, but not sufficiently explained, or which will be mentioned in the following pages.

Decantation. The removal of a supernatant liquid from a precipitate or sediment collected at the bottom of a vessel. It is effected by merely pouring it out, or by the aid of a syringe, syphon, or pipette.

Destructive Distillation. A process whereby organic bodies, being subjected to a high temperature, air being excluded, lose their original form, and yield new products.

Digestion. Strictly this term implies the process of dissolving a medicinal substance in a menstruum by the aid of sustained heat for a variable time, at a temperature a little below the boiling point. It is, however, frequently used as synonymous with *infusion* and *maceration.*

Distillation. The process of separating volatile from fixed ingredients in solution. The liquid is heated to a sufficient temperature to produce vapour, and this is then condensed by means of cold in another part of the apparatus.

Elutriation. The process by which powders of different degrees of fineness are separated from each other. They are suspended and carefully diffused through water, the whole being allowed to stand for different intervals, the fluid being decanted after each interval. The heaviest particles fall first.

Evaporation. The conversion of fluid into vapour by raising the temperature to various degrees, as may be required in different instances.

Filtration and Straining. The separation of solid particles from the fluids in which they are suspended. Straining is conducted rapidly, and is imperfect. Filtering is practised through various media according to circumstances (paper, calico, flannel, etc.), made into *filters.*

Lixiviation. The process adopted for the separation of the soluble from the insoluble parts of certain substances. It is a variety of solution by *percolation.*

Maceration. The process of making a solution of a drug with a menstruum at the ordinary temperature of the air. The liquid is poured over the medicinal substance, and allowed to remain in contact with it for a variable period.

Percolation. Filtering in such a way that the liquid shall come in contact with the whole of the contents of the filter or *percolator,* in order to obtain a medicated filtrate. The substance to be acted upon is suspended in the percolator in the course of the menstruum, which thus dissolves out the required ingredients as it permeates through it.

Precipitation. The process by which a solid substance is separated from a fluid in which it was previously dissolved, either as crystals, amorphous powder, or magma. Usually the precipitate is thrown down.

Saturation. Pharmaceutically this signifies that a liquid has dissolved as much of a solid substance as it is capable of taking up.

Standardizing. This is a new process, introduced into the recent edition of the B.P., with the object of securing a constant strength of certain preparations, by adjusting the proportion of

alkaloids or other powerful agents which they contain.

Sublimation. The vaporisation of solid volatile substances by heat, by a process analogous to distillation (*dry distillation*), the vapour being afterwards condensed by the aid of cold.

Trituration. The pulverization of drugs, as performed by means of a pestle and mortar or other apparatus. In several instances the solid matter, having been reduced to a nearly uniform state of disintegration, is passed through a sieve of a particular sized mesh. The degrees of disintegration are represented by numbers ranging from No. 20 to No. 60; these numbers indicating the number of parallel wires of ordinary thickness within a linear inch forming the meshes of the sieves used.

Washing. The removal of impurities from precipitates, crystals, etc., by passing a stream of water or other fluid over them.

5. Physiological and Therapeutic Action.

Therapeutic agents are ranged under certain groups, according to their action upon the body generally, or upon its various systems and organs. These groups are recognised by definite terms, which are in ordinary use, and which will be employed in the following pages. It has, therefore, appeared to me desirable to attempt some comprehensive classification, and to explain the meaning of the several terms. It will be understood that the classification does not aim at being scientifically accurate, and that the mode of action or other

details are not discussed, but merely sufficient information is given to afford the student elementary instruction on this part of the subject, and to enable him to understand the significance of the terms which are in common use in relation to the physiological and therapeutical action of remedies.

A. Agents used as External or Local Remedies.

The groups included under this division are generally employed in connection with the skin or surface of the body, but some of them are also applied to mucous or serous surfaces. They produce more or less evident objective effects.

1. **Caustics** or **Escharotics.**—These destroy more or less deeply and extensively the structures to which they are directly applied, the more powerful producing an *eschar* or *slough*.

2. **Irritants.**—There are three subdivisions of this group, but they all cause irritation of the skin or other surface to which they are applied, leading to congestion or to different degrees and forms of inflammation. Irritants include:—

   a. *Rubefacients*, which merely produce congestive redness, of a temporary and transient character.

   b. *Vesicants* or *Epispastics*, which are "blistering" agents, inducing cutaneous inflammation attended with accumulation of serum under the cuticle, and the formation of vesicles, blebs, or blisters.

   c. *Pustulants*, which excite a form of inflammation leading to a pustular eruption, in some cases quite peculiar and characteristic.

(*Counter-irritant* is a term much in vogue, and one that is often used very inaccurately. It really

cannot be definitely associated with any particular group of therapeutic agents, but rather refers to one of the purposes for which the irritants just alluded to, as well as certain others, are employed. Briefly counter-irritation may be defined as the artificial production of irritation in one part, with the view of modifying certain morbid processes or conditions in another part, with which it has no direct connection. *Revulsant* is practically synonymous with counter-irritant. *Derivant* signifies the development of an artificial congestion in some part of the body, intended to relieve a morbid congestion in some other more or less distant part).

3. **Emollients** and **Demulcents.**—Emollients are bland substances which soften the skin or other structure to which they are applied. Demulcents merely form a part of this group, which consist of mucilaginous or gummy solutions in water.

4. **Protectives.**—These include applications intended to cover a surface in such a way that it shall be protected against the injurious action of air and other sources of irritation.

5. **Detergents.**—Agents used for the purpose of cleansing the surface of the skin.

6. **Absorbents.**—Strictly defined, an absorbent is a substance which absorbs or condenses into itself gaseous or liquid materials with which it is brought into contact. (The term is also employed to indicate any method of treatment which aims at the absorption of inflammatory or other morbid products, and in this connection is often particularly associated with certain *alteratives*).

7. **Local Refrigerants.**—Agents which cool a surface or part to which they are directly applied, some of them being capable of producing marked coldness.

B. Agents having both a Local and Remote or General Effect.

1. **Antacids.**—The members of this group neutralize acids, and several of them, when their effects are carried beyond a certain point, become *alkalizers*. They are divided into *direct* and *remote*, according as they act by immediate contact, or after absorption into the system, affecting the blood and secretions. Some antacids act in both ways.

2. **Acids.**—The numerous acids are used therapeutically for a variety of purposes, but they may be grouped together on account of their action as acids, in contra-distinction to the preceding group, by virtue of which they neutralize alkalinity from any cause, and may even produce or increase acidity in certain fluids, especially the urine.

3. **Astringents.**—It is difficult to give a concise definition of this important group, and its members by no means produce exactly similar effects. The primary idea is that of binding up, constricting, or contracting living soft tissues. Other effects which different astringents tend to produce are to coagulate albuminous fluids, or to precipitate them from alkaline solutions; to constrict the blood-vessels; to diminish secretions and morbid discharges; and to dry up surfaces.

4. **Hæmostatics—Styptics.**—These are astringents used for the special purpose of arresting hæmorrhage, whether local or remote.

C. Agents Affecting the General System.

1. **Diluents.**—These include inert liquids which can be introduced into the system in large quantity, for the purpose of diluting the fluids of the body,

and making them more watery. By washing away in the excretions various waste or morbid products, they become *depurant*.

2. { **Refrigerants.** / **Febrifuges.** / **Anti-** or **Apyretics.** } A large number of remedies are employed for the purpose of allaying various degrees of fever or pyrexia. For practical purposes they may be ranged under the three divisions given above, which have respectively the following significations:—

a. *Refrigerants* are agents which relieve thirst, and thus aid in diminishing febrile disturbance.

b. *Febrifuges* may be defined as the milder classes of remedies used for allaying fever, and they act in various ways.

c. *Anti- or apyretics* are agents, many of them of a powerful nature, which are employed for the definite object of directly lowering febrile excess of temperature, especially when it tends to assume a high degree.

3. **Depletants.**—This group includes modes of treatment intended to deplete or reduce the system, relieving plethora, causing general depression, and often leading to loss of weight.

4. **Antiperiodics.**—These are remedies which have a marked influence in curing or modifying certain so-called *periodic* diseases, such as ague and other malarial affections. It is at present doubtful where this group should be placed, but provisionally it may be noticed in this connection.

5. **General** or **diffusible stimulants.**—The word *stimulant* is of extensive application, and signifies an agent which temporarily excites or stimulates some function or set of functions. A *diffusible stimulant* acts so rapidly and vigorously

as to rouse all the vital organs into activity, the entire system being thus speedily influenced.

6. **Tonics** and **Nutrients.**—The term *tonic* is also employed in several relations, signifying a remedy which restores lost or impaired tone, either to the body as a whole, or to some individual system, organ, structure, or part, thus tending permanently to promote functional activity and vigour, and to increase power. A *nutrient* improves nutrition directly, and in this way acts as a tonic. In the present connection the following sub-divisions may be mentioned, namely :—

a. General tonics, which improve the condition and tone of the whole system, especially of the voluntary muscles.

b. Blood-tonics or *hæmatinics*, which nourish and improve the quality of the blood.

7. **Alteratives.**—This is a class of remedies difficult to define, but they may be said to alter or modify the process of nutrition and tissue-change, thus influencing certain morbid processes or conditions intimately associated therewith. They usually produce their effects gradually, quietly, and imperceptibly, but these effects are often remarkably striking and definite, as illustrated by the absorption of morbid products or even of healthy tissues. (An alterative used for this purpose is, as already stated, not uncommonly called an *absorbent*). Some alteratives influence the whole body; others particular systems or classes of structures; and others again special morbid processes or diseases, such as syphilis.

D. Agents used in connection with particular Systems or Organs.

I. Nervous and Muscular Systems.

For practical purposes these two systems may be considered together, as they are intimately associated in relation to the action of remedies. The nervous system is also concerned with the effects produced upon many organs and structures by therapeutic agents, but in the present connection only those groups will be noticed which obviously affect some portion or other of this system, whether the brain, spinal cord, or nerves. They may be conveniently arranged in the following way:—

1. **Cerebral Stimulants.**—A class of stimulants which primarily act upon the brain, causing more or less exhilaration and increased mental activity, followed by stimulation of the vascular and other systems. They may cause undue excitement, leading to intoxication, or to delirium of an active or even violent character.

2. **Cerebral Sedatives.**—The term *sedative* has not previously occurred, and it is another of those expressions which have a wide application. In general it implies the alleviation or suppression of undue excitability or irritability of every kind, whether sensory, motor, or affecting special functions. A *cerebral sedative* subdues mental excitement and restlessness, producing a sense of calmness and serenity.

3. **Soporifics** or **Hypnotics.**—This is an important group of agents which are employed for the purpose of inducing natural sleep. Many of them belong also to the next group, according to the dose which is given.

4. **Narcotics.**—These have a more marked effect upon the cerebral functions than the preced-

ing, causing stupor, culminating in narcotism or coma, and ultimately leading to a fatal termination if given beyond a certain amount.

5. **Anodynes** or **Analgesics.**—These are remedies which are employed for the relief of pain. They are divided into *general* or *local*, according as they act through the nerve-centres, after administration; or upon the nerves or nerve-endings, especially when locally applied.

6. **Anæsthetics.**—The meaning of an anæsthetic is something which completely annuls or destroys sensation. There is an important subdivision of the group, however, into *general* and *local*, which demands special recognition.

General anæsthetics are those which, when inhaled as gas or vapour, cause temporary loss of consciousness, with loss of sensation, and often muscular relaxation or paralysis, and other phenomena. These effects are more or less rapidly produced, and pass away when the inhalation is discontinued. If carried beyond a certain point, a general anæsthetic may cause death.

Local anæsthetics destroy sensation over a limited area to which they are directly applied.

7. **Spinal Stimulants—Excito-Motors.**—The members of this group stimulate or excite the spinal cord, the effects being chiefly seen upon the motor functions, as evidenced by increased reflex irritability, and spasmodic disturbance of the voluntary muscles, terminating in tetanic contraction—hence named *Tetanizers*. More or less cutaneous hyperæsthesia is also often produced.

8. **Spinal Sedatives—Depresso-Motors.**—These agents produce a sedative or depressant effect upon the spinal cord, reflex irritability being impaired and finally abolished, accompanied with muscular weakness, terminating in paralysis. They subdue any tendency to undue excitability of the cord.

9. **Local Sedatives.**—There is a class of remedies, which may be thus designated, which relieve certain unpleasant or troublesome sensations connected with the skin, but which cannot properly be classed as anodynes. Itching is a typical sensation of this kind. Local sedatives act upon the nerve-endings, when applied over the seat of the irritation.

10. **Nervine Tonics.**—The group thus named is supposed to act upon the nervous system as a whole, producing some effect not well-understood, but evidenced by improved general nervous tone. Some drugs are believed to have a special nutrient effect upon nerve-structures.

11. **Antispasmodics.**—In its comprehensive and proper sense, the term antispasmodic includes all agents which arrest or control spasmodic muscular movements of every kind. It is, however, employed very vaguely, and is often restricted to a comparatively unimportant class of drugs, which affect spasms of a particular kind.

II. The Eye.

Members of some of the groups already considered are frequently applied in connection with the eyes, but there are certain special effects which may be produced on these organs, evidenced by a change in the size of the pupil, through some action upon the iris, and loss of power of visual accommodation, in consequence of interference with the ciliary muscle. The agents which cause these effects may do so only on local application, after internal administration, or both, and they are named:—

1. **Mydriatics,** which dilate the pupils, and destroy the power of accommodating vision to

near objects, owing to paralysis of the ciliary muscle.

2. **Myotics,** which contract the pupils, and cause loss of accommodation for distant objects, as the result of spasm of the ciliary muscle.

III. Alimentary Canal and Hepatic Apparatus.

It will be convenient to take these systems together, and without attempting any elaborate classification, the several groups may be considered in the following order:—

1. **Sialagogues.**—These are agents which cause an increased flow of saliva and buccal mucus; carried beyond a certain degree, they produce more or less salivation or ptyalism.

2. **Anti-sialics.**—These diminish the salivary and buccal secretions, and cause dryness of the mouth.

3. **Carminatives.**—The group thus named act upon the muscular coat of the stomach and intestines, and are also known as *gastric* or *stomachic* and *intestinal stimulants*. They stimulate and regulate the muscular action of the stomach, checking any tendency to spasm (*antispasmodics*), and promoting normal and efficient movements, thus aiding digestion, and expelling any undue accumulation of gases. It is supposed also that they cause relaxation of the sphincter at the cardiac end of the stomach, or of the lower end of the œsophagus, and sometimes of the pyloric sphincter, the expulsion of gas being thus helped. The intestines are acted upon in a similar way, their normal peristaltic movements being increased.

4. **Gastric** or **Stomachic Sedatives.**—These allay pain or any abnormal irritability of the stomach, especially that form which leads to nausea and vomiting, (also called *anti-emetics*); or control

undue muscular excitability, by which the food is driven out of the stomach before digestion is properly accomplished.

5. **Gastric** or **Stomachic Tonics.**—The agents thus named improve appetite, and promote the muscular tone of the stomach, thus aiding digestion, and acting indirectly as general tonics.

6. **Peptogens—Anti-peptogens.**—These terms may be applied to remedies which respectively increase or diminish the secretion of gastric juice.

7. **Emetics.**—This is a well-known group, which cause *emesis* or vomiting. According to their concomitant effects, they are divided into (*a*) *simple*, (*b*) *stimulant*, and (*c*) *depressant or nauseant emetics*. They are also classed as (*a*) *direct* or *reflex*, and (*b*) *indirect* or *centric*, according as they only cause sickness after direct contact with the stomach, by a reflex action; or when introduced into any part of the body, affecting the nerve-centres which govern the act of vomiting.

8. **Digestants.**—This is a class of agents intended to supply the place of the normal secretions which take part in the digestion of food, when these are absent or deficient, as well as under certain other circumstances. The salivary, gastric, pancreatic, and biliary secretions may be thus substituted. Digestants are not only administered internally, but are also employed to act upon food before its introduction into the system, and to aid digestion in the rectum.

9. **Purgatives** or **Cathartics.**—As a general group purgatives may be simply defined as remedies which act upon the bowels, and assist the intestinal evacuations. They usually modify the characters of the stools, and often cause diarrhœa. Purgatives are arranged under certain sub-divisions, as follows:—

a. *Laxatives*, or mild aperients.
b. *Simple purges*, which act more efficiently, but as a rule produce little or no irritation.
c. *Drastic*, which are powerful purgatives, tending to excite more or less violently the peristaltic movements of the intestines, and thus to cause much griping; and also to irritate the mucous surface, which may end in inflammation and irritant poisoning.
d. *Hydragogue*, or "watery purgatives," which produce a free flow of fluid from the mucous surface of the bowels, and thus promote the removal of water out of the system. They are not necessarily irritant, but some of them tend to be more or less "drastic."
e. *Saline*, a group of neutral salts of potassium, sodium, or magnesium, which have a purgative action, and usually cause more or less watery stools.
f. *Cholagogue*, which occasion a more or less copious discharge of bile, giving rise to bilious stools.

10. **Intestinal Sedatives.**—These are antagonistic to purgatives, tending to subdue the action of the bowels, and to restrain any abnormal irritability. They are often used in combination with astringents, to check diarrhœa.

11. **Cholagogues.**—Apart from its association with purgatives, the term *cholagogue* may be applied to all agents which increase the flow of bile. They comprise two sub-divisions, namely:—
a. *Hepatic stimulants*, which promote the secretion of bile by the liver.
b. *Bile-expellents*, (specially called *Cholagogues* by Brunton), which merely drive the bile already formed out of the gall-bladder and ducts.

12. **Anthelmintics.**—These are remedies used for the purpose of getting rid of intestinal worms. They are divided into :—

a. Vermicides, which kill or easily dislodge the worms.

b. Vermifuges, which merely expel the worms out of the bowel, whether living or dead.

IV. Respiratory System.

Several of the groups already alluded to are extensively used in connection with the respiratory apparatus, but those definitely associated with this system are within a limited range.

1. **Sternutatories—Errhines.**—Sternutatories are substances which, when brought into contact with the nasal mucous membrane, cause sneezing. Errhines produce a free flow of watery mucus from the surface.

2. **Pulmonary Stimulants.**—These stimulate the respiratory function, promoting the act of breathing and the due aeration of the blood, or exciting the act of coughing under certain circumstances.

3. **Pulmonary Sedatives** or **Depressants.**—The remedies thus designated either subdue and regulate the respiratory act when it is excited or irregular and spasmodic ; or deaden the sensibility of the mucous membrane of the air-passages, thus relieving irritable cough. Many of them tend to depress the function of breathing, making the act infrequent and feeble, and ultimately arresting it.

4. **Expectorants.**—This term is used very indefinitely, but in general it implies a class of agents which promote the expulsion of secretions and morbid products from the lungs and air-passages, either by modifying their characters, or

by aiding the act of expectoration. Expectorants are commonly divided into (*a*) *sedative* or *depressant*, which lower blood-pressure, and produce increased and more liquid secretion ; and (*b*) *stimulant*, which increase blood-pressure, and diminish secretion, or which assist the act. Remedies are often used for the special purpose of lessening the amount of expectoration; or for altering its quality, and thus rendering it more easy of expulsion.

V. Vesicular System.

The action of remedies upon the vascular system is often more or less complicated, and it is not easy to give a satisfactory classification. Many act both on the heart and vessels, but taking these structures separately, the following groups may be recognised.

1. **Cardiac Stimulants.**—These are stimulants which act more immediately upon the heart, exciting more frequent and vigorous action, and thus increasing the rapidity and force of the circulation, the pulse becoming more frequent and stronger.

2. **Cardiac Sedatives** or **Depressants.**—This is a class of sedatives which affects the heart, subduing its action when excessive, both in frequency and force. Carried beyond a certain point they become marked *cardiac depressants*, and ultimately prove fatal by arresting the heart in diastole.

3. **Cardiac Tonics** and **Regulators.**—The action of the group now under consideration is more gradual and permanent. A *cardiac tonic* usually signifies a drug which exercises a controlling influence upon the heart when it is acting inefficiently, and rendering its beats much more powerful and usually much slower. The diastole is prolonged, so that the ventricles fill properly; the

systole is more energetic and effectual, the ventricles being thus thoroughly emptied; and arterial tension is raised. To the remedies thus defined I think the term *cardiac regulators* may be conveniently applied. There is another class of cardiac tonics, in which the nutrition of the muscular wall of the heart is gradually improved, and thus its action is permanently benefited.

4. **Vascular Stimulants—Vaso-Dilators.**—This group may be made to include all substances which dilate the peripheral vessels, and thus increase the rapidity of the circulation through them. There are certain remedies which do this with remarkable quickness and energy over the whole body, and these might be specially termed *vaso-dilators*. Vascular stimulants may be *general* or *local* in the extent of their action, and this subdivision is important in practice.

5. **Vascular Sedatives — Vaso-Constrictors.**—These contract the peripheral vessels, and thus diminish the circulation of the blood. They are also divisible into *general* or *local*.

6. **Vascular Tonics.**—As defined by Brunton, "Vascular tonics are substances which cause increased contraction of the arterioles or capillaries. They not only raise the blood-pressure, but influence to a considerable extent the quantity of lymph poured out into the tissues or absorbed from them, and thus modify tissue-change."

VI. Cutaneous System.

A large number of therapeutic agents are used in connection with the skin, and for a variety of purposes. Moreover, several drugs are liable to produce cutaneous eruptions or rashes when administered internally. The remedies specially

employed to affect the function of the skin are divisible into two groups, namely :—

1. **Diaphoretics** or **Sudorifics,** which increase the perspiration, often producing more or less evident or profuse sweating, and to these the term *sudorific* has been specially applied.

2. **Anhydrotics,** which diminish or check the perspiration, tending to cause dryness of the skin.

VII. Urinary System.

From a therapeutic point of view the parts of this system which have to be distinguished are the kidneys, as excreting organs; the bladder as a muscular apparatus; and the entire tract of the urinary mucous membrane. Moreover, the urine itself and certain other possible contents of the urinary apparatus have to be borne in mind. The several groups may be thus arranged:—

1. **Diuretics.**—These are agents which promote the functions of the kidneys, and increase the quantity of urine, or of some of its more important normal constituents, thus aiding elimination, as well as promoting the discharge of water out of the system.

2. **Anti-diuretics.**—This term may be applied to substances which diminish the flow of urine, especially when it is excessive.

3. **Lithontriptics.**—The members of this group prevent the deposition of ingredients of the urine, which tend to form gravel or calculi; or which dissolve these after they have been formed.

4. **Specifics to Mucous Surface.**—There is no special name for the remedies now under consideration, but they include substances which are eliminated by the urine after administration, and produce a definite or specific action either upon the

entire membrane of the urinary tract, or upon some particular portion of it, as that lining the bladder or urethra. It must also be remembered that the urine may be modified by agents belonging to various groups, such as astringents, antacids, acids, or antiseptics, and may thus influence the urinary apparatus or its contents.

5. **Vesical Sedatives.**—These are agents which diminish undue irritability of the bladder, relieving the sensations connected therewith, and tending to check any abnormal frequency of micturition.

6. **Vesical Stimulants** and **Tonics.**—The muscular coat of the bladder may be temporarily or permanently improved in its action, a stimulant or tonic effect being respectively produced. Retention or incontinence of urine are thus influenced, in the case of incontinence the sphincter vesicæ being strengthened in its action.

VIII. Generative System.

The groups demanding notice under this heading are as follows:—

1. **Aphrodisiacs** excite sexual desire and increase sexual vigour.

2. **Anaphrodisiacs** act in the opposite direction, diminishing sexual desire and power, and they may ultimately cause impotence.

3. **Emmenagogues.**—The members of this group promote the menstrual flow, if deficient, irregular, or suppressed from any cause, whether or not attended with pain.

4. **Anti-emmenagogues.**—This term may be applied to remedies which check the menstrual flow when it is excessive, either in frequency or amount.

5. **Ecbolics** or **Oxytocics.**—These are uterine stimulants, which cause the muscular wall of the uterus to contract more or less powerfully, and to expel its contents, if there are any.

6. **Galactagogues — Anti-galactagogues.** — These terms may be respectively applied to agents which increase or diminish the secretion of milk.

IX. Special Groups.

There are a few groups which cannot be conveniently classed under any of the foregoing divisions, and they may be brought together here.

1. **Anti-parasitics** or **parasiticides** destroy living parasites inhabiting various parts of the body, whether animal or vegetable.

2. **Deodorants** destroy disagreeable and offensive smells of various kinds, either in connection with the body, or apart from it.

3. **Antiseptics** primarily include agents which prevent or retard the process of putrefaction of dead organic matters (*antiputrescents*). The term *antiseptic* is now used more particularly to signify the prevention of the formation of septic matters, or their destruction, so that they cannot injure the system, and they are commonly supposed to do this by their effect upon living organisms or germs.

4. **Disinfectants** are agents which destroy infection, and prevent the spread of infectious diseases, by some action upon the specific poisons by which these are severally originated, and by which they are conveyed from one individual to another.

5. **Antidotes** are substances which destroy or neutralize the injurious effects of poisons, when brought into direct contact with them, especially

in the stomach, but also in other parts of the body.

6. **Antagonists** are also named *physiological antidotes*, signifying that different agents produce directly opposite and contrary physiological effects, and that one may be employed to counteract the effects of its antagonist, either when introduced into the system in any way, or in some instances when locally applied.

Section II.

THE INORGANIC KINGDOM.

In the inorganic kingdom we have to deal with drugs belonging to the three sub-divisions already indicated, namely :—1. **Non-metallic,** 2. **Metallic,** 3. **Special Chemical Compounds.** It is not my intention, however, to separate them thus absolutely, but to adopt a plan of arrangement which I have found practically useful and convenient, bringing together medicinal agents which are allied either pharmaceutically or therapeutically, in the following order :—

I. *Aqua—Water.*

II. *Carbo—Carbon* or *Charcoal.*

III. *Sulphur Group.*

IV. *Chlorine* and *Hypochlorites.*

V. *Iodine* and certain *Iodides.*

VI. *Bromine* and *Bromides.*

VII. *Phosphorus* and *Hypophosphites.*

VIII. *Acids* (with some exceptions).

IX. *Alkalies* { 1. Ammonium. 2. Potassium. 3. Sodium. 4. Lithium.

X. *Alkaline Earths*
1. Aluminium.
2. Calcium.
3. Magnesium.
4. Cerium.

XI. *Ordinary Metals*
1. Antimonium—Antimony.
2. Arsenicum—Arsenic.
3. Argentum—Silver.
4. Bismuthum—Bismuth.
5. Cuprum—Copper.
6. Ferrum—Iron.
7. Hydrargyrum—Mercury.
8. Manganesium—Manganese.
9. Plumbum—Lead.
10. Zincum—Zinc.

XII. *Special Chemical Products*
1. Hydrocyanic Acid.
2. Alcohol Group.
3. Ether Group.
4. Chloroform.
5. Iodoform.
6. Hydrate of Chloral.
7. Butyl-Chloral Hydrate.
8. Nitrite of Amyl.
9. Nitro-Glycerine Tablets.
10. Carbolic Acid and Creosote.
11. Paraffin, hard and soft.

The consideration of each of the divisions just enumerated is carried out according to a tolerably uniform plan, although it has to be varied in particular cases; and it may help to make the subject clearer by giving at the outset an explanatory sketch of this plan, as indicating the course of procedure which the student may advantageously adopt in learning the drugs belonging to the several groups.

1. A *general summary* of the members of each division is first given, should there be more than one; the *nature* and *chemical composition* of the more

important being also pointed out. Thus a comprehensive knowledge is obtained of the compounds and officinal preparations of a particular drug, before studying them individually; and such knowledge is of the greatest service when employing them for therapeutic purposes.

2. The (*a*) *source*, and (*b*) *mode of preparation* of the simple or "elementary" drugs, and of what may be termed their "primary compounds," are then considered; the "secondary compounds" or *officinal preparations* being as a rule discussed later on under PHARMACY. In some instances the facts under this head relating to each compound have to be learnt separately, but in others they can be conveniently discussed more or less in groups.

In describing the *mode of preparation* of the different drugs, I have endeavoured to bring out prominently and distinctly the several parts of the process, when it is at all a complicated one, without entering unnecessarily into details. I have also indicated the proportions of the ingredients, when so ordered in the B.P. This, however, has been done rather for reference, and the student need not burden his memory with these proportions, unless he wishes to do so; nor need he learn the exact words in which the preparation is described, but he should endeavour clearly to understand the process, and may then describe it in his own way. Equations showing the nature of decompositions are often given, although not contained in the B.P.

It may be useful to point out here the general methods by which the officinal salts are made, which may help the student in remembering particular drugs. They may be stated as follows:—

a. By the purification of salts, either found in the native state (nitre), or produced during certain processes, such as burning wood (carbonate of

potassium), or the ripening of wine in casks (cream of tartar).

b. By dissolving metals in acids, either strong or diluted.

c. By dissolving oxides or salts, especially carbonates, in acids, and thus neutralizing or decomposing them.

d. By the direct admixture and combination of the elements themselves.

e. By double decomposition of solutions of salts.

f. By fusing together solid substances.

g. By mixing together certain ingredients, and heating them in the dry state, the salt required being sublimed and then condensed.

h. By more or less complicated and elaborate processes, each of which must be separately studied.

3. The *characters* and *properties* are next indicated, and I have endeavoured to bring out prominently those which are important, and in doing so have found it in several instances convenient to group or tabulate the drugs. It must be insisted upon that the student ought to be quite familiar with the appearance and obvious characters of the solid preparations belonging to the inorganic kingdom, when these are at all striking, such as whether they are in powder or crystals, the size and form of the crystals, the colour, smell, &c. Moreover, the solubility of a substance in different menstrua is often a matter of considerable importance to remember, especially in relation to pharmacy. Other properties in many cases demand special recognition; and, amongst others, the changes to which preparations are liable on exposure to air or light are frequently of much consequence.

4. The subject of *tests*, which naturally follows, or is hardly separable from what has just been considered, demands a few words of special comment, as this will save much repetition hereafter.

The *objects* for which tests are employed in the B.P., in relation to drugs belonging to the inorganic kingdom, may be thus indicated:—

a. To determine the *nature* of a drug. Each element, whether metallic or non-metallic, has its own peculiar tests; and in the case of salts, the acid present also yields its special tests.

In some instances it is further important to distinguish between different oxides and salts of the same metal, as in the case of iron and mercury.

b. In the course of certain *pharmaceutical processes*, to ascertain whether they are properly completed. Thus in washing precipitates to remove a soluble salt, the washings are tested to determine when they are free from this salt. The same principle is followed in some other cases.

c. To detect *impurities* and *adulterations*, whether resulting from the materials used in preparation the vessels employed, accidental or intentional admixture, or decomposition.

d. For the *quantitative estimation* of a drug, so as to determine whether it is of proper composition and strength.

The student's knowledge of chemistry ought to make him quite familiar with the principal tests by which the various drugs are recognised, as described in the B.P., and all that he has to do is to apply this knowledge in each case, in relation to non-metallic elements, metals, acids, oxides salts, and special preparations. I have therefore felt justified in entirely omitting any reference to these tests in the account given of the different drugs; but it must be understood, once for all, that the student might be fairly required to mention these tests in an examination on Materia Medica. Further, I have not as a rule alluded to tests in relation to pharmaceutical processes, because the student can apply the same knowledge

ere; for instance, I merely state that a "precipi-
ıte is washed from such and such a salt," the
›mpletion of this process being determined by
sting the washings for the salt in question.
oreover, with regard to impurities and adultera-
›ns, I have deemed it sufficient to mention these,
ecause to give their tests in each case would only
volve unnecessary repetition, and the student
ay easily learn them once for all. A general
mmary of the chief impurities and adulterations
drugs, with their tests, will be given imme-
ately.

The *quantitative tests* are of considerable import-
ıce in several instances, and I have endeavoured
arrange and group these under a distinct head-
g in each case, and to explain their meaning.

As regards the *nature* of the tests employed in
e B.P., they are mainly:—

a. The solubility of a drug in water or other
enstrua.

b. The effects of heat upon it.

c. Special chemical tests.

Impurities and Adulterations.—The chief im-
rities or adulterations of the drugs belonging
the inorganic kingdom recognised in the B.P.,
d their distinguishing tests in different cases,
ıy be thus arranged:—

Water . . .	1. Moistens blotting paper. 2. Loss of weight on drying. 3. Turns anhydrous sulphate of copper blue (in alcohol). 4. Absorbed by chloride of calcium.
Fixed impurities or adulterations— Silica, Alumina, Lime, etc. . .	Not volatilized by heat. Special tests for each.

c. Chlorine . .	Odour.
d. Iodine or Iodides .	Blue colour with mucilage of starch, when iodine is free or liberated.
e. Arsenic . . .	Deposit on copper foil when heated with it; other special tests.
f. Antimony . .	Special tests.
g. Certain Metals—Lead, Copper, Iron, etc. . .	Discoloured or precipitated by H_2S; and special tests for each.
h. Lime . . .	White precipitate with oxalate of ammonium.
i. Carbonates . .	1. Effervesce with acids. 2. White precipitate with solution of lime.
j. Hydrochloric Acid and Chlorides .	Curdy white precipitate with nitrate of silver, insoluble in nitric acid, soluble in excess of ammonia.
k. Nitric Acid and Nitrates . .	Dark purple colour in contact with protosulphate of iron and sulphuric acid.
l. Oxalic Acid . .	White precipitate with sulphate of lime.
m. Phosphoric Acid—(In phosphate of iron) . . .	Dissolve in HCl; add tartaric acid and ammonia, and then solution of ammonio-sulphate of magnesia; a white precipitate is thrown down

n. Sulphurous Acid	1. Reddens moistened litmus paper. 2. H_2S formed with granulated zinc in hydrochloric acid, which blackens paper moistened with solution of subacetate of lead. 3. Liberates iodine from iodate of potash in acetic acid, which colours starch blue.
o. Sulphuric Acid and Sulphates	White precipitate with chloride of barium.

In the *Appendix* of the B.P. a list is given of substances and solutions employed for testing purposes, and in several instances their preparation is described. These will be separately enumerated, so as to avoid the necessity of mentioning them in different parts of this work, except in certain special instances.

5. With respect to the *pharmacy* of the drugs belonging to the inorganic kingdom, the plan followed is (*a*) to consider the *officinal preparations*, giving their constituents and their proportions, with any important details as to their preparation; (*b*) to mention *other preparations* of which they are ingredients, or in making which they are employed; and (*c*) to point out the chief *incompatibles*.

6. As regards the *pharmacology* and *therapeutics* of the drugs, my intention, as previously intimated, is merely to give a general summary of their *actions*, as expressed by the terms already defined, and in many instances it will be convenient and useful to group agents together for this purpose.

I. AQUA—WATER = H_2O.

Simple water is recognized in the B.P. in two forms, namely:—

1. *Aqua—Water.*—Natural water, the purest that can be obtained, cleared, if necessary, by filtration. It should be free from colour, odour, unusual taste, and visible impurity. The most pure natural waters are ice from certain lakes, snow-water, and rain-water. All contain more or less organic and inorganic impurities.

2. *Aqua Destillata—Distilled water.*—Distil ten gallons of water from a copper still connected with a block-tin worm; reject the first half gallon (which carries over the volatile impurities), and preserve the next eight gallons.

Tests.—The purity of distilled water is tested as follows:—

a. A fluid ounce evaporated in a clean glass capsule leaves scarcely a visible residue.

b. It is not affected by solution of lime; sulphuretted hydrogen; chloride of barium; nitrate of silver; oxalate of ammonium; or a mixture of starch, mucilage, and iodide of potassium.

c. It gives only a faint yellow coloration when a solution of potassio-mercuric iodide is added to three or four ounces.

Pharmacy.—1. As already mentioned, there is a special group of pharmaceutical preparations recognized in the B.P., named Aquæ.

2. *Aqua* is to be used whenever "water" is ordered in the B.P. *Distilled water* is ordered to be employed in making a large number of pharmaceutical preparations. In dispensing prescriptions, *aqua* should be understood to mean *distilled water.*

Its advantages over natural water are:—*a.* Its purity. *b.* That it dissolves more of some substances than ordinary water. *c.* That there is less liability to decomposition.

Action.—Externally water may be used for several purposes, according to its temperature, mode of application, and other circumstances. Indeed there is scarcely a group of local therapeutic agents to which it may not be thus made to belong. Internally it may be generally classed as a **diluent.** Tepid water is an **emetic.**

II. CARBO—CARBON—CHARCOAL=C.

General Summary.—There are three forms of carbon, and one officinal preparation recognized in the B.P., namely:—

1. *Carbo Ligni—Wood charcoal.*—Carbon, leaving about 2 per cent. of ash when burned at a high temperature, with free access of air.

a. Cataplasma carbonis.

2. *Carbo Animalis—Animal charcoal—Bone-black.*—About 10 per cent. of carbon, the remainder consisting almost entirely of phosphate of lime, with a little carbonate of lime and iron carbide.

3. *Carbo Animalis Purificatus—Purified animal charcoal.*—Animal charcoal from which the earthy salts have been almost wholly removed. When burned at a high temperature with a little red oxide of mercury and free access of air, it leaves not more than about 2 per cent. of residue.

Source and Preparation.—1. *C. Ligni.*—Wood charred by exposure to a red heat without access of air.

2. *C. Animalis.*—The residue of bones which have been exposed to red heat, without access of air.

3. *C. Animalis Purificatus.*—This is made thus:—

a. Mix { **Hydrochloric acid,** fl ℥ 10 / **Distilled water,** Oj. } and add **bone-black,** in powder, ℥ 16, stirring occasionally.

b. Digest at a moderate temperature for 2 days, agitating from time to time.

c. Collect the undissolved charcoal on a calico filter, and wash with distilled water from hydrochloric acid.

d. Dry the charcoal, and heat it to redness in a closely covered crucible.

Characters and Properties.—The properties of the several varieties of charcoal may be grouped in the following way:—

1. *Appearance.—C. Ligni* is in black, brittle, very light, porous, easily powdered pieces, retaining the form and texture of the wood from which it was obtained; *C. Animalis* is a greyish-black, coarse powder; *C. Animalis Purificatus*, a fine black powder.

2. They are all odourless and almost tasteless.

3. They are insoluble in water.

4. They possess great power of absorbing and condensing gases, especially *wood charcoal*, owing to its porosity. It acts best when recently made, or when kept in sealed bottles. After a time it becomes inert, but its absorbent action is restored after exposure to a dull-red heat.

5. They also absorb odorous and septic matters; and oxidize them by means of oxygen taken up from the atmosphere.

6. They further absorb organic colouring matters, alkaloids, bitter principles, &c., from solutions, especially *purified animal charcoal*. Ten or twelve grains well shaken with an ounce of water containing about a fluid drachm of solution of litmus, removes the dissolved colouring matter; the mixture when thrown upon a filter passing through colourless.

Pharmacy.—1. *Officinal Preparation:—*

Cataplasma Carbonis.—A poultice made with boiling water, crumb of bread, linseed meal, and wood charcoal, which is half mixed, and half sprinkled over the surface of the poultice.

2. *Purified animal charcoal* is much used in pharmacy as a decolorizing agent in the preparation of alkaloids, &c. *Wood charcoal* is employed in pre-

paring sulphurous acid, iodides of potassium and sodium, bromide of potassium, and sulphurated lime.

ACTION.—Charcoal is mainly used as an **antiseptic, deodorant,** and **disinfectant.** In the stomach it is an **absorbent,** especially of gases, and probably checks decomposition and fermentation of food. Purified animal charcoal also acts as an **antidote** to certain poisons, as corrosive sublimate, nux vomica or strychnine, and opium.

III. SULPHUR GROUP.

General Summary.—It will be convenient to consider in this group not only sulphur, but also certain unstable compounds of this element, which are employed for similar or allied therapeutic effects, according to the following plan :—

1. *Sulphur—Brimstone.*
2. *Acidum Sulphurosum—Sulphurous Acid.* Solution of sulphurous anhydride gas, SO_2, in water = 5 per cent. by weight = 6·4 per cent. of real sulphurous acid, H_2SO_3.
3. *Sodii Sulphis—Sulphite of Sodium* = $Na_2SO_3,7H_2O$.
4. *Sulphuretted Hydrogen* = H_2S (in *Appendix*); and certain *Sulphides*, namely :—
   a. *Sulphydrate of Ammonium* = NH_4HS (in *Appendix*).
   b. *Calx Sulphurata—Sulphurated Lime.* A mixture containing not less than 50 per cent. of sulphide of calcium = CaS.
   c. *Potassa Sulphurata—Sulphurated Potash.* Of uncertain composition, but consisting chiefly of sulphide of potassium, K_2S_3, with some hyposulphite, sulphate, and sulphite.
5. *Hyposulphite of Sodium* (in *Appendix*).

(Certain *sulphides* are omitted, because they are compounds of sulphur with other powerful drugs).

A. Sulphur—Brimstone = S.

The forms of sulphur and its officinal preparations, as recognised in the B.P., include :—

1. *Sulphur Sublimatum—Sublimed Sulphur* or *Flowers of Sulphur.*

2. *Sulphur Præcipitatum—Lac Sulphuris* or *Milk of Sulphur.*

3. *Officinal Preparations* { *a.* Confectio Sulphuris. *b.* Unguentum Sulphuris.

Source and Preparation :—

1. *Sulphur Sublimatum.* Prepared from crude or rough sulphur by sublimation.

2. *Sulphur Præcipitatum.* Obtained by a complicated process, essentially as follows :—

a. Boil { **Sublimed sulphur,** ℥ 5 / **Slaked lime,** ℥ 3 / **Water,** successively Oj. and O½ } and filter.

$$3Ca2HO+6S_2=2CaS_5+CaS_2O_3+3H_2O$$

b. Dilute the cooled mixed filtrates with water, Oij, and add in successive quantities **hydrochloric acid,** fl ℥ 8, diluted with water, Oj, until effervescence ceases, and the mixture acquires a slight acid reaction.

$$2CaS_5+CaS_2O_3+6HCl=3CaCl_2+3H_2O+6S_2$$

c. Allow the precipitate to settle, decant the supernatant fluid, and wash the deposit with water, until this ceases to give an acid reaction, and to precipitate with oxalate of ammonium.

d. Collect the precipitated sulphur on a calico filter, wash with water, and dry under 120°.

Characters and Properties.—The two varieties of sulphur have similar properties, except as regards their obvious physical characters.

1. *S. Sublimatum* is a slightly gritty powder, of a fine greenish-yellow colour, or may be cast into moulds. *S. Præcipitatum* is greyish-yellow, soft, and free from grittiness. Under the microscope it is seen to consist of opaque globules, without any admixture of crystalline matter.

2. Both are tasteless and odourless, unless heated.

3. They do not redden moistened litmus paper.

4. They are insoluble in water, but soluble in bisulphide of carbon, hot oil of turpentine, and slightly in fixed oils, especially on boiling.

5. Sulphur is entirely volatilized by heat; it burns in an open vessel with a blue flame, and emits a suffocating odour, SO_2 being evolved.

IMPURITIES.—These are SO_2; H_2S; fixed impurities, especially sulphate of calcium (sulphuric acid being used in the preparation of precipitated sulphur instead of hydrochloric); and arsenic, as As_2S_3, which when agitated with solution of ammonia, filtered, and evaporated, leaves a residue, giving the tests of arsenic.

PHARMACY.—1. *Officinal Preparations:*—

a. Confectio Sulphuris. Mix well {Sublimed sulphur, 4; Acid tartrate of potassium, 1; Syrup of orange-peel, 4; Tragacanth, $\frac{1}{24}$.

Dose—gr. 60 to 120.

b. Unguentum Sulphuris. Mix {Sublimed Sulphur, 1; Benzoated Lard, 4.

2. *Sublimed sulphur* is used in the preparation of:—

Acid Sulphuricum
Antimonium Sulphuratum
Potassa Sulphurata
Sulphuris Iodidum.

It is also an ingredient in:—

Emplastrum Hydrargyri
Emplastrum Ammoniaci cum Hydrargyro
Pulvis Glycirrhizæ Compositus.

(In the plasters it is used as a means of facilitating the subdivision of the mercury).

ACTION.—Sulphur when burnt in the air forms SO_2 gas, and is thus a powerful **antiseptic, disinfectant,** and **deodorant.** Employed in this manner also, or directly applied to the skin, it is a **parasiticide,** especially for the itch-insect; and

a local **stimulant** or **irritant**. Internally sulphur is a valuable **laxative**, a **sudorific**, and an **alterative** in certain conditions.

Dose—Of either form 20 to 60 grains.

B. Acidum Sulphurosum—Sulphurous Acid = H_2SO_3.

The sulphurous acid of the B.P. is a solution of sulphurous anhydride gas, SO_2, in water=5 per cent. by weight; equivalent to 6·4 per cent. of real sulphurous acid, H_2SO_3.

Source and Preparation.—Obtained by heating **sulphuric acid** fl ʒ 4, with **wood charcoal** broken into small fragments, ʒ j, in a glass flask. The SO_2 gas is passed by means of a glass tube through a wash-bottle containing fl ʒ 2 of water, and then into distilled water, fl ʒ 30, in a cooled receiver.

$$\begin{cases} C+2H_2SO_4=2H_2O+CO_2+2SO_2. \\ H_2O+SO_2=H_2SO_3. \end{cases}$$

Characters and Properties:—

1. Sulphurous acid is a colourless liquid, of sp. gr. 1·025.

2. It has a pungent sulphurous odour.

3. It leaves no residue when evaporated.

4. Sulphurous acid is a powerful decolorizing, deodorizing, and disinfecting agent; it also arrests fermentation and putrefaction.

5. It gives but a very slight precipitate with chloride of barium, until solution of chlorine is added, showing absence of sulphuric acid, which forms by long keeping.

Quantitative Test.—64 grains mixed with one pint of recently boiled and cooled distilled water and a little mucilage of starch, do not acquire a

permanent blue colour with the *Vol. solution of iodine*, until 1000 grain-measures of the latter have been added.

ACTION.—Sulphurous acid is a valuable **antiseptic** and **disinfectant**; it is also **anti-parasitic**, especially as regards vegetable organisms, and arrests fermentation in the stomach.

Dose—fl 3 ½ to 1.

C. SODII SULPHIS—SULPHITE OF SODIUM. Na_2SO_3, $7H_2O$.

SOURCE AND PREPARATION.—Obtained by the action of **sulphurous acid** on **carbonate of sodium** or on **caustic soda.**

CHARACTER AND TESTS:—

1. Sulphite of sodium is in monoclinic prisms; colourless and transparent.
2. The crystals are efflorescent in dry air.
3. The salt is inodorous; with a cooling saline and sulphurous taste.
4. It is readily soluble in water, and very soluble in spirit.
5. The aqueous solution has a neutral or faintly alkaline reaction, and evolves a sulphurous odour with HCl.

ACTION.—Sulphite of sodium is practically only used as an **antiseptic**, either locally or internally.

Dose—gr. 5 to 20.

D. SULPHURETTED HYDROGEN AND SULPHIDES.

1. *Sulphuretted Hydrogen* = H_2S. This gas is a powerful agent, and is present in a class of mineral waters—*Sulphuretted Waters*—which smell like

rotten eggs. Some of these also contain alkaline sulphides.

In the B.P. sulphuretted hydrogen is mentioned in the preparation of Acidum Hydrobromicum Dilutum; and is inserted in the *Appendix* for the purpose of testing for various metals. It is used as a gas, prepared by the action of **sulphuric acid** on **sulphide of iron**; and it should be washed by passing it through a bottle containing water.

2. *Sulphydrate of Ammonium* = NH_4HS. This compound is only recognised in the *Appendix* of the B.P., in the form of a test-solution, prepared by passing a stream of H_2S into **solution of ammonia** to saturation; adding **solution of ammonia**; and preserving in a green-glass stoppered bottle.

3. *Calx Sulphurata—Sulphurated Lime—Sulphide of Calcium.* A mixture containing not less than 50 per cent. of sulphide of calcium (CaS).

Source and Preparation:—

1. Mix thoroughly in fine powder { **Sulphate of calcium,** 7 **Wood charcoal,** 1.

2. Heat to redness in an earthen crucible until the black colour has disappeared.

3. Cool, and at once place the whitish residue in a stoppered bottle.

Characters.—A nearly white powder, with a smell somewhat resembling that of sulphuretted hydrogen.

4. *Potassa Sulphurata—Sulphurated Potash—Hepar Sulphuris—Liver of Sulphur.* This salt is of uncertain composition, but consists chiefly of potassium sulphide = K_2S_3, with some hyposulphite, sulphate, and sulphite.

Source and Preparation:—

a. Mix together { **Carbonate of potassium,** 2 **Sublimed sulphur,** 1,

and heat in a crucible, first gradually until effervescence ceases, and then to dull redness until they are perfectly fused.

$$3K_2CO_3+4S_2=K_2S_2O_3+2K_2S_3+3CO_2$$

b. Pour out the fused liquid, air being excluded during solidification by an inverted porcelain basin.

c. Break the solid product into fragments when cold, and preserve in a green-glass, closely-stoppered bottle.

(Too much heat causes decomposition of the hyposulphite into sulphate and sulphite).

CHARACTERS AND PROPERTIES :—

1. Sulphurated potash occurs in irregular solid brittle fragments.

2. It is greenish externally, but liver-brown when recently broken; it readily becomes dull-white when exposed to the air, owing to oxidation, sulphate of potassium being formed.

3. It emits a strong odour of H_2S, especially when moistened.

4. It is alkaline; and has an acrid taste.

5. Sulphurated potash is readily soluble in water, forming a yellow solution, with the smell of H_2S, which is evolved freely when excess of HCl is dropped into it, sulphur being deposited. About 50 per cent. is soluble in rectified spirit.

PHARMACY.—*Officinal Preparation* :—

Unguentum Potassæ Sulphuratæ.

Sulphurated potash, gr. 30
Hard paraffin, ʒ ¼
Soft paraffin, ʒ ¾.

Triturate the sulphurated potash in a mortar, and gradually add the melted mixture of the paraffins, rubbing together until the ointment is perfectly smooth.

Action.—Used externally most of this group are supposed to be cutaneous **stimulants** and **sudorifics,** and may become **irritants.** Sulphurated potash is only employed as an ointment. Internally they are **purgative, diaphoretic, expectorant,** and **alterative,** especially in the form of sulphuretted mineral waters. Sulphide of calcium is believed to have a remarkable effect in preventing or checking suppuration.

Dose—Of Calx Sulphurata, gr. $\frac{1}{10}$ to 1.

E. Hyposulphite of Sodium.

Although used therapeutically for similar purposes to sulphurous acid, this compound is only recognised in the *Appendix* of the B.P., as a *volumetric test-solution,* containing 24·8 grains in 1000 grain-measures of water, for the purpose of estimating free *iodine,* and thus also of indirectly determining the amount of *chlorine* in certain compounds.

IV. CHLORINE AND HYPOCHLORITES.

General Summary.—In this group may be included the following preparations, which either contain free chlorine, or readily evolve this gas.

1. *Liquor Chlori.*—Solution of chlorine gas in about half its volume of water = ·6 per cent. of the solution by weight, or gr. 2·66 in fl ℥ 1.

2. *Calx Chlorinata—Chlorinated lime.*—This may be regarded as consisting chiefly of a compound of hypochlorite and chloride of calcium ($CaCl_2O_2$, $CaCl_2$), or as a direct compound of chlorine and lime ($CaOCl_2$) = 33 per cent. of available chlorine.

a. Liquor Calcis Chlorinatæ.

b. Vapor Chlori.

3. *Liquor Sodæ Chlorinatæ—Solution of Chlorinated Soda.*—Solution of hypochlorite of sodium (NaClO), chloride of sodium, and bicarbonate of sodium = about 2½ per cent. of available chlorine.

a. Cataplasma Sodæ Chlorinatæ.

A. Liquor Chlori—Solution of Chlorine.

Source and Preparation.—By heating gently **hydrochloric acid,** fl ℥ 6, **black oxide of manganese,** in fine powder, ℥ i, and **water,** fl ℥ 2; passing the liberated chlorine gas through water in a small phial; and receiving it into a large bottle containing water, fl ℥ 30; which is disconnected when the chlorine ceases to be developed, and shaken till all the gas is absorbed. Keep in a green-glass bottle, well-stoppered, in a cool and dark place. It is best used freshly prepared.

$$4HCl + MnO_2 = MnCl_2 + 2H_2O + Cl_2$$

Characters and Properties:—

1. Solution of chlorine is a yellowish-green liquid; sp. gr. 1·003.

2. It has a strong odour of chlorine; acrid and very irritating to the air-passages.

3. It leaves no residue on evaporation.

4. It is a powerful bleacher, immediately discharging the colour of a dilute solution of sulphate of indigo; and is also disinfectant and deodorant, replacing hydrogen in many organic compounds.

5. The solution is readily decomposed in the light, forming HCl and O.

Quantitative Test.—20 grains of iodide of potassium, dissolved in fl ʒ 1 of water, and added to fl ʒ 1 or 439 grains of liquor chlori, the mixed solution acquires a deep-red colour, which requires for its discharge 750 grain-measures of *Vol. solution of hyposulphite of sodium*.

B. Calx Chlorinata—Chlorinated Lime.

Source and Preparation.—A product obtained by exposing **slaked lime,** loosely spread out in a proper vessel, to the action of **chlorine gas,** as long as it is absorbed.

Characters and Properties:—

1. Chlorinated lime is a dull white powder, with a feeble odour of chlorine.

2. It is partly soluble in water. The solution evolves chlorine copiously upon the addition of oxalic acid, and deposits oxalate of calcium.

3. It possesses the bleaching and other properties of chlorine in less degree.

Quantitative Test.—When fresh, 5 grains mixed with 15 grains of iodide of potassium, dissolved in fl ʒ 4 of water, produces, when acidulated

with fl 3 1 of HCl, a reddish solution, which requires for the discharge of its colour at least 467 grain-measures of *Vol. solution of hyposulphite of sodium*.

PHARMACY.—1. *Officinal Preparations:*—

a. Liquor Calcis Chlorinatæ.

Triturate in a mortar { Chlorinated lime, 1 / Distilled water, 10 };

and shake well together several times in a stoppered bottle for three hours. Filter through calico; and preserve the solution in a stoppered bottle.

A clear solution; sp. gr. 1·055.

The quantitative test described above shows that it contains at least about 2 per cent. of available chlorine, and it may yield about 3 per cent.

b. Vapor Chlori.—This is simply made by moistening chlorinated lime with water in a suitable apparatus, and inhaling the vapour. The gas may also be allowed to pass into the atmosphere for disinfecting purposes.

2. Chlorinated lime is used in the preparation of chloroform.

C. LIQUOR SODÆ CHLORINATÆ.

SOURCE AND PREPARATION:—

1. Dissolve { **Carbonate of sodium,** ℥ 24 / **Water,** O 2.

2. Thoroughly triturate { **Chlorinated lime,** ℥ 16 / **Water,** O 6 } and filter.

3. Well mix the solutions; again filter. Keep the solution in a stoppered bottle in a cool and dark place.

CHARACTERS AND PROPERTIES:—

1. This is a colourless liquid; sp. gr. 1·054.

2. It is alkaline in reaction.

3. It has a feeble odour of chlorine; and an astringent taste.

4. It decolorises sulphate of indigo.

5. It is decomposed by HCl, evolving Cl gas, and little or no CO_2.

QUANTITATIVE TEST.—70 grains added to { Iodide of potassium = gr. 20 / Water = fl ʒ 4 }, and acidulated with fl ʒ 2 of HCl, the mixture assumes a brown colour, requiring for its discharge at least 500 grain-measures of *Vol. solution of hyposulphite of sodium.*

PHARMACY.—*Officinal Preparation :—*

Cataplasma Sodæ Chlorinatæ.—A hot linseed meal poultice mixed with liquor sodæ chlorinatæ in the following proportions :—

Solution of chlorinated soda, 1
Linseed meal, 2
Boiling water, 4.

ACTION OF CHLORINE AND HYPOCHLORITES.

Practically the preparations included in this group are mainly used as **disinfectants, antiseptics,** or **deodorants.** Solution of chlorine acts as a **cutaneous stimulant** or **irritant**, and is sometimes employed for this purpose, either as a bath, or by sponging the skin. The vapour inhaled in a diluted form is **expectorant,** but tends to irritate the respiratory mucous membrane. Internally liquor chlori and liquor sodæ chlorinatæ are occasionally given, and are supposed to be **alterative** and **nervine stimulant,** as well as **antiseptic.**

Doses—Of Liquor Chlori or Liquor Sodæ Chlorinatæ, ♏10 to 20.

V. IODINE AND IODIDES.

General Summary.—It will be useful to give here a complete list, not only of the preparations of Iodine, but also of the officinal Iodides and their compounds. Some of the latter will also be considered in this connection, as they are practically employed on account of the iodine which they contain; others will be more conveniently discussed elsewhere, as they are combinations of iodine with other powerful medicines, and are used therapeutically for their combined effects.

1. *Iodum—Iodine* = I.
2. *Officinal Preparations containing free Iodine* . .
   - *a.* Linimentum Iodi.
   - *b.* Liquor Iodi.
   - *c.* Tinctura Iodi.
   - *d.* Unguentum Iodi.
   - *e.* Vapor Iodi.
3. *Arsenii Iodidum—Iodide of Arsenic* = AsI_3.
   - *a.* Liquor Arsenii et Hydrargyri Iodidi.
4.
   - *a.* Syrupus Ferri Iodidi.
   - *b.* Pilula Ferri Iodidi.
5. *Hydrargyri Iodidum Rubrum—Red Iodide of Mercury* = HgI_2.
   - *a.* Unguentum Hydrargyri Iodidi Rubri.
6. *Plumbi Iodidum—Iodide of Lead* = PbI_2.
   - *a.* Emplastrum Plumbi Iodidi.
   - *b.* Unguentum Plumbi Iodidi.
7. *Potassii Iodidum—Iodide of Potassium* = KI.
   - *a.* Linimentum Potassii Iodidi cum Sapone.
   - *b.* Unguentum Potassii Iodidi.
8. *Sodii Iodidum—Iodide of Sodium* = NaI.
9. *Sulphuris Iodidum—Iodide of Sulphur.*
   - *a.* Unguentum Sulphuris Iodidi.

A. Iodum—Iodine. I.

Source and Preparation.—Iodine is obtained from "kelp," the burnt ashes of sea-weeds, and from mineral iodides and iodates. Although the preparation is not described in the B.P., it will be well to give an outline of the process by which this element is obtained from kelp.

1. The salts are dissolved out by water.
2. The solution is concentrated, and certain salts are crystallised out.
3. The remaining solution is treated with **sulphuric acid.** Hydriodic acid is formed; gases escape; and sulphate of sodium, mixed with sulphur, crystallises out.
4. **Black oxide of manganese** is added to the acid solution, which is then heated. The iodine volatilizes, and is condensed in receivers.

$$2HI + MnO_2 + H_2SO_4 = MnSO_4 + 2H_2O + I_2.$$

Characters and Properties:—

1. Iodine occurs in laminar crystals.
2. It has a dark colour, with metallic lustre.
3. It is volatile, with a marked and peculiar odour, somewhat like that of chlorine.
4. Iodine melts when heated; then sublimes entirely, in the form of a beautiful violet-coloured vapour.
5. It is very sparingly soluble in water, but is freely dissolved by alcohol, by ether, and by a solution of iodide of potassium.
6. Iodine readily penetrates animal textures, and stains the skin yellow.

Tests and Impurities.—1. The aqueous solution of iodine gives a deep-blue colour with starch.

2. Its impurities and their tests are:—
   a. Water—moistens blotting-paper.
   b. Iodide of Cyanogen—the first portion that sublimes includes slender colourless prisms, emitting a pungent odour.
   c. Fixed impurities or *adulterations* (charcoal, plumbago, iron, black oxide of manganese, &c.). These remain after sublimation.

3. *Quantitative test.*—1000 grain-measures of *Vol. solution of hyposulphite of sodium* are required for the complete decoloration of 12·7 grains of iodine, dissolved in fl ʒ i of water with 15 grains of iodide of potassium.

PHARMACY.—1. *Officinal Preparations:*—

Liquid Preparations. There are three liquid preparations of iodine, in all of which iodide of potassium is present to aid solution. It will be observed that they differ considerably in their relative strength. They are all made by merely dissolving the ingredients in the several menstrua.

a. Linimentum Iodi = 1 in 9.
Iodine, 5
Iodide of potassium, 2
Glycerine, 1
Rectified spirit, 40.
Intense blood colour.

b. Liquor Iodi = 5 in 100.
Iodine, gr. 22
Iodide of potassium, gr. 33
Distilled water = fl ʒ i.
Deep blood colour.

c. Tinctura Iodi = 1 in 40.
Iodine, ʒ ½
Iodide of potassium, ʒ ½
Rectified spirit, Oj.
Intense brown-red.

d. Unguentum Iodi.

Iodine, gr. 32
Iodide of potassium, gr. 32
Glycerine, fl ʒ i
Prepared lard, ʒ 2.

Rub the solid ingredients with the glycerine, and mix with the lard.

e. Vapor Iodi.—This vapor is made by simply mixing { Tincture of iodine, fl ʒ i / Water, fl ʒ i } in a suitable apparatus, and applying a gentle heat.

2. Iodine is used in the preparation of iodides of arsenium, potassium, sodium, and sulphur; the pill and syrup of iodide of iron; and iodoform.

3. *Incompatibles.*—Ammonia, metallic salts, mineral acids, vegetable astringents.

B. Potassii Iodidum — Iodide of Potassium. KI.

Source and Preparation.—This salt is obtained by the following process:—

1. Add **iodine** in small quantities at a time to **solution of potash,** C1, in a glass or porcelain vessel, until the solution acquires a permanent brown tint.

2. Evaporate to dryness in a porcelain dish, pulverize the residue, and mix intimately with **wood charcoal** in fine powder, ʒ 3.

3. Throw the mixture in small quantities at a time into a red hot iron crucible, and when the whole is fused, pour out the contents.

4. When cool, dissolve in boiling distilled water, O2, filter through paper, wash the filter, evaporate the liquid till a film forms on the surface, and set aside to crystallise.

5. Drain the crystals, and dry them quickly in a warm place. More crystals may be obtained from the mother liquor. Keep in a stoppered bottle.

(In the first stage of the process a mixture of iodide and iodate is formed:—

$$6KHO + I_6 = 5KI + KIO_3 + 3H_2O.$$

When heated with charcoal, the iodate is converted into iodide:—$KIO_3 + C_3 = KI + 3CO$).

Characters and Properties.—

1. Iodide of potassium is in cubic crystals, colourless, and generally opaque.

2. It is easily soluble in water, in a less degree in spirit.

3. It should be neutral, but has commonly a feeble alkaline reaction.

4. The taste is saline, acrid, and bitterish.

5. A solution mixed with mucilage of starch, gives a blue colour on the addition of a minute quantity of solution of chlorine. It yields the other tests of iodine and potassium.

Impurities.—The chief of these are iodate, chloride, and carbonates. When iodate is present, it is liable to be decomposed, the iodide developing the colour and odour of free iodine; it also tends to disagree with the stomach, owing to its liberation by the acid of the gastric juice. It is detected by giving a blue colour in solution with tartaric acid and mucilage of starch.

Quantitative Test.—Ten grains require for complete precipitation about 602 grain-measures of *Vol. solution of nitrate of silver.*

Pharmacy.—1. *Officinal Preparations:—*

a. Linimentum Potassii Iodidi cum Sapone.

Dissolve in a porcelain dish over a water bath, { Curd soap in shreds, ℥ 2; Glycerine, fl ℥ 1; Distilled water, fl ℥ 10.

Mix briskly in a mortar until cold with { Iodide of potassium, powdered, ℥ 1½.

Set aside for an hour; then rub well with } Oil of lemon, fl ʒ 1.

A cream-like product.

b. Unguentum Potassii Iodidi.

Iodide of potassium, gr. 64 Carbonate of potassium, gr. 4 Water, fl ʒ i Benzoated lard, ʒ i.	Dissolve the salts in the water, and mix thoroughly with the lard.

(The carbonate is added to prevent the ointment from turning yellow).

2. Iodide of potassium is contained in Linimentum Iodi, Liquor Iodi, Tinctura Iodi, and Unguentum Iodi.

3. *Incompatibles.*—The chief incompatibles of iodide of potassium are acids; spirits of nitre; and vegetable preparations containing starch.

C. Sodii Iodidum—Iodide of Sodium. NaI.

Source and Preparation.—This salt may be obtained by the process described in connection with iodide of potassium, **solution of soda** being used in place of solution of potash.

Characters and Properties:—

1. Iodide of sodium is a white, crystalline powder.
2. It should be dry, but is deliquescent.
3. It is readily soluble in water and spirit.
4. The aqueous solution is neutral.
5. The taste is saline and somewhat bitter.
6. It gives the tests of iodine and sodium.

Impurities.—Similar to iodide of potassium.

Quantitative Test.—Ten grains require for complete precipitation, about 660 grain-measures of *Vol. solution of nitrate of silver.*

D. Sulphuris Iodidum—Iodide of Sulphur. SI.

Source and Preparation:—

1. Rub together { **Iodine,** 4 / **Sublimed sulphur,** 1 } in a glass or earthenware mortar until thoroughly mixed.

2. Put into a flask, close the orifice loosely, and apply heat, at first gently, until the colour has become uniformly dark, and then increase the heat so as to produce liquefaction.

3. Withdraw the heat, and when the liquid has congealed, remove the mass by breaking the flask, reduce it into pieces, and keep these in a well-stoppered bottle.

Characters and Properties:—

1. Iodide of sulphur is a greyish-black solid substance, with a radiated crystalline appearance.

2. It has the odour of iodine; and stains the cuticle when applied to it.

3. It is insoluble in cold water; soluble in glycerine (1 in 60).

4. It is very unstable. If 100 grains be thoroughly boiled with water, the iodine will pass off in vapour, and about 20 grains of sulphur will remain.

Pharmacy.—*Official Preparation:*—

Unguentum Sulphuris Iodidi.

Iodide of sulphur, 5
Hard paraffin, 18
Soft paraffin, 55.

Triturate the iodide, and gradually add the melted paraffins, rubbing together until cold and free from grittiness.

Action of Iodine and Iodides.

1. Iodine is **antiseptic** and **disinfectant,** and is sometimes used for the latter purpose apart from the body.

2. As external and local applications iodine and the iodides are more or less **irritant,** and also act as **local alteratives,** promoting the absorption of morbid products. The stronger preparations of iodine are **vesicant;** and this drug is a **parasiticide** in certain combinations. It is also used for its direct effects upon mucous and serous membranes. The preparations of the iodides intended for local application are mainly used for their alterative effects, but they may also be more or less irritating. The iodide of sulphur is merely employed as an external application.

3. As an inhalation iodine vapour is irritant to the respiratory mucous membrane, and may be employed as an **errhine, expectorant,** or **antiseptic.**

4. For internal administration iodine itself is only seldom used, in the form of tincture. The iodides of potassium or sodium are the salts generally given, when a simple iodide is required. Their effects are numerous and variable under different circumstances, and the chief actions attributed to them may be summed up as **sialagogue, errhine, expectorant, diuretic, alterative** (especially for syphilis), **vascular depressant, anodyne, emmenagogue,** and **anaphrodisiac.** Probably some of these effects are due to the alkalies with which the iodine is combined. Iodine is also an **eliminator of lead** out of the system, and probably of mercury. Iodide of potassium is much used in the treatment of aneurism. When an iodide is given beyond a certain point, *iodism* is

produced, indicated by the symptoms of a "cold in the head," such as frontal headache, puffiness of the eyelids with redness of the conjunctivæ, running from the eyes and nose, and sneezing; irritation of the respiratory mucous membrane, giving rise to cough and expectoration; soreness of the mouth and throat, with salivation; and gastric and intestinal irritation. Sometimes a skin-eruption appears, varying in kind; and there may be marked physical and mental depression.

Doses—Tincture of Iodine, 5 to 20 minims.
Iodide of Potassium, gr. 2 to 20 or more.
Iodide of Sodium, gr. 3 to 10 or more.

VI. BROMINE AND BROMIDES.

General Summary.—In this group the following are included :—

1. *Bromum—Bromine,* Br.
2. *Ammonii Bromidum—Bromide of Ammonium,* NH_4Br.
3. *Potassii Bromidum—Bromide of Potassium,* KBr.
4. *Sodii Bromidum—Bromide of Sodium,* NaBr.

A. Bromum—Bromine. Br.

Source and Preparation.—The B.P. merely states that bromine is "obtained from sea-water, and from some saline springs." Without entering into details, it may be stated that "bittern," the liquid left after crystallising chloride of sodium out of sea-water, is treated with a current of chlorine gas, which liberates the bromine; this is dissolved out by shaking it up with ether; and is purified by converting it into bromide of potassium, and decomposing this salt by means of black oxide of manganese and sulphuric acid.

Characters and Properties:—

1. Bromine is a dark brownish-red liquid.
2. It is very volatile, giving off red vapours at the common temperature; and it boils at from 135° to 145°.
3. It has a strong and disagreeable odour and taste; the vapour being extremely irritating to the respiratory mucous membrane.
4. Sp. gr. = 2·97 to 3·14.
5. Bromine is slightly soluble in water (1 in 30); soluble in alcohol and ether.

PHARMACY.—Bromine is introduced into the B.P. for the purpose of preparing hydrobromic acid and the officinal bromides. There is also a test-solution in the *Appendix*.

ACTION.—Bromine is a **caustic** and **disinfectant,** but is practically never used therapeutically.

B. BROMIDES.

The officinal bromides enumerated in the summary may be conveniently considered together.

SOURCE AND PREPARATION.—1. *Bromide of ammonium* may be formed by neutralizing **hydrobromic acid** with **ammonia,** evaporating, and crystallising.

2. The *bromides of potassium* and *sodium* are made by a similar process to the iodides, namely, by adding **bromine** to **solution of potash** or **soda;** evaporating to dryness; fusing with **wood charcoal;** dissolving in water, filtering, and setting aside to crystallise. (For details see IODIDE OF POTASSIUM). The proportions given in the B.P. are:—

Solution of potash or **soda,** O 2
Bromine, ℥ 4, or a sufficiency
Wood charcoal, ℥ 2
Boiling distilling water, O 1½.

CHARACTERS AND PROPERTIES:—

1. All the bromides are in crystals, those of bromide of potassium being of good size and cubical; but bromide of sodium appears as a granular powder, consisting of small monoclinic crystals.

2. They are colourless or white, but bromide of ammonium may become slightly yellow by exposure to the air.

3. They are readily soluble in water; much less soluble in spirit.

4. They are inodorous; but have a pungent saline taste, or that of bromide of sodium is said to be simply saline.

5. Bromide of ammonium may be sublimed unchanged. Bromide of sodium is somewhat deliquescent.

6. The several salts give the tests for bromine and their respective bases.

IMPURITIES.—The chief of these are iodide, sulphate, and carbonate.

QUANTITATIVE TESTS:—

	Grain-measures of Vol. Solution of Nitrate of Silver.
1. *Bromide of Ammonium.*—Five grains dissolved in an ounce of distilled water, to which two drops of solution of yellow chromate of potassium have been added, require to produce a permanent red precipitate	508·5 to 514·5
2. *Bromide of Potassium.*—Ten grains require for complete decomposition	838 to 850
3. *Bromide of Sodium.*—Ten grains of the dry salt require .	about 960

ACTION OF BROMIDES.

1. As local applications the bromides are sometimes used as **anodynes**; and they deaden the sensibility of the throat and larynx.

2. Internally the bromides are chiefly employed for their effects upon the nervous and muscular systems, being **cerebral sedatives, hypnotics, spinal sedatives** and **depressants,**

and **antispasmodics.** They are also in various doses **pulmonary sedatives,** especially affecting the sensibility of the larynx; **cardiac sedatives** or **depressants; anaphrodisiacs; emmenagogues;** and **alteratives.** When given for some time they are liable to cause irritation of the alimentary canal; and also the condition termed *bromism,* characterized by loss of all sensation in the throat and larynx; sexual weakness or impotence; a skin-eruption of various kinds; and marked physical and mental depression.

Doses—Bromide of Ammonium, gr. 2 to 20.
Bromide of Potassium, gr. 5 to 30.
Bromide of Sodium, gr. 10 to 30.

VII. PHOSPHORUS AND HYPOPHOSPHITES.

General Summary.—In this group are included:—

1. *Phosphorus.* { *a.* Oleum phosphoratum. *b.* Pilula phosphori.

2. *Calcii Hypophosphis—Hypophosphite of Calcium*, $Ca(PH_2O_2)_2$.

3. *Sodii Hypophosphis—Hypophosphite of Sodium*, $NaPH_2O_2$.

I. Phosphorus. P.

Source and Preparation.—The B.P. merely says, "a non-metallic element obtained from bones." Without entering into details, it may be stated that phosphorus is prepared from bone-ash, by digesting it with dilute sulphuric acid; filtering and evaporating the solution; heating with charcoal; collecting the sublimed phosphorus in a receiver containing cold water; purifying it by melting under water, and shaking with a mixture of bichromate of potash and sulphuric acid; melting and casting into moulds.

Characters and Properties.—Phosphorus occurs in an *ordinary* and an *allotropic* form, but the former is alone officinal.

1. Phosphorus is a soft and flexible, wax-like solid, usually in sticks or moulds. Sp. gr. 1·77.

2. It is almost colourless and semi-transparent when fresh, but tends to become opaque and white, or reddish on the surface, from oxidation.

3. It is luminous in the dark, and emits white vapours when exposed to the air.

4. Phosphorus is insoluble in water, in which it is kept; soluble in ether, olive oil, melted fats, naphtha, boiling oil of turpentine, and bisulphide of carbon; sparingly soluble in boiling rectified spirit.

5. It melts at 110°, and is highly inflammable, igniting in the air at a temperature a little above its melting point, burning with a luminous flame, and producing dense white fumes = phosphoric anhydride, P_2O_3.

PHARMACY.—1. *Officinal Preparations:—*

a. Oleum Phosphoratum—Phosphorated Oil.

Phosphorus, gr. 16
Almond oil, fl ℥ 4.
About 1 per cent.

Dissolved by heating in a stoppered bottle placed in hot water to 180°, and shaking together.

A clear straw-coloured oil; phosphorescent in the dark.

b. Pilula Phosphori—Phosphorus Pill.

Phosphorus, gr. 3
Balsam of Tolu, gr. 120
Yellow wax, gr. 57.

Put the phosphorus and balsam into a mortar about half full of hot water; when melted and softened, rub them together under water until no particles of phosphorus are visible, at a temperature of about 140°, add the wax, and as it softens mix thoroughly with the other ingredients. Cool without exposure to air, and keep immersed in cold water in a bottle.

When dispensed, every two grains of the product is to be incorporated with one grain of curd soap; a few drops of rectified spirit being used, if necessary, to soften the whole.

Three grains contain $\frac{1}{30}$ grain of phosphorus.

2. Phosphorus is used in the preparation of Acidum Phosphoricum Concentratum, and Calcii Hypophosphis.

II. Calcii Hypophosphis—Hypophosphite of Calcium. $Ca(PH_2O_2)_2$.

Source and Preparation.—Obtained by heating **phosphorus** and nearly twice its weight of **hydrate of calcium** with **water** until phosphuretted hydrogen gas ceases to be evolved; then filtering the liquid; separating uncombined lime with **carbonic acid gas**; and evaporating the remaining solution until the salt separates in a crystalline condition.

Characters and Properties:—

1. Hypophosphite of calcium is in small crystals, white, with a pearly lustre.
2. It is soluble in cold water (1 in 6), and hot water (1 in 8); insoluble in cold rectified spirit.
3. It has a bitter nauseous taste.
4. The crystals do not lose water when heated to 300°. Heated to redness they ignite, evolving phosphuretted hydrogen, and leaving a reddish-coloured residue amounting to about 80 per cent. of the salt.

III. Sodii Hypophosphis—Hypophosphite of Sodium. $NaPH_2O_2$.

Source and Preparation.—Obtained by adding **carbonate of sodium** to solution of **hypophosphite of calcium** as long as a precipitate of carbonate of calcium is formed, then filtering the solution and evaporating it to dryness by the heat of a steam-bath, keeping it constantly stirred when the salt begins to solidify.

CHARACTERS AND PROPERTIES:—

1. Hypophosphite of sodium is a white granular salt.

2. It is deliquescent; very soluble in water and spirit, but insoluble in ether.

3. It has a bitter nauseous taste.

4. It ignites at a red heat, and gives off phosphuretted hydrogen. It is rapidly attacked by oxidising agents.

ACTION OF PHOSPHORUS AND HYPOPHOSPHITES.

1. Locally applied phosphorus is a strong **escharotic,** but is rarely used for this purpose.

2. Internally phosphorus and the hypophosphites are powerful **nervine tonics.** They are also regarded as **general tonics, nutrients** to certain tissues, **alteratives,** and **aphrodisiacs.** Phosphorus has been credited with remarkable powers as a **diffusible stimulant.** It is a strong poison, and when long-continued, even in minute doses, is liable to produce fatty degeneration of certain organs. The hypophosphites are much less irritating than phosphorus.

Doses—Oleum Phosphoratum, ♏5 to 10.
Pilula Phosphori, gr. 2 to 4
Calcii Hypophosphis, gr. 5 to 10.
Sodii Hypophosphis, gr. 5 to 10.

VIII. THE OFFICINAL ACIDS.

General Summary.—A large number of acids are recognised in the B.P. as distinct preparations; but some thus named are not really acids. In their actions and therapeutic uses they present considerable differences. The only characters they present in common are that they have usually an acid reaction to test-paper, and that they combine with bases to form salts. It will be useful to give here a complete list of the officinal compounds regarded as acids, but many of them are more conveniently considered in other parts of this work. They may be arranged in the following sub-divisions, *A.* signifying *Acidum,* and the English name being omitted :—

A. Strong Inorganic Liquid Acids.

1. *A. Hydrochloricum.*—A solution of HCl gas in distilled water = about 32 per cent. by weight.

2. *A. Nitricum—Aqua Fortis.*—A solution of HNO_3 in water = 70 per cent. by weight, or 60 per cent. of anhydrous N_2O_5.

3. *A. Phosphoricum Concentratum* = H_3PO_4 with 33·7 per cent. of water.

4. *A. Sulphuricum—Oil of Vitriol.*—A strong acid, containing about 98 per cent. of H_2SO_4.

B. Dilute Inorganic Liquid Acids.

1. *A. Hydrobromicum Dilutum.*—An aqueous solution containing 10 per cent. by weight of gaseous or real hydrobromic acid, HBr.

2. *A. Hydrochloricum Dilutum* = 10·58 per cent. of HCl, or 36·5 grains in 6 fluid drachms.

3. *A. Nitricum Dilutum* = 17·44 per cent. of real nitric acid, HNO_3.

4. *A. Nitro-hydrochloricum Dilutum.*—Contains free chlorine, hydrochloric, nitric, and nitrous acids, and other compounds, dissolved in water.

5. *A. Phosphoricum Dilutum.*—A solution of H_3PO_4 in water = 13·8 per cent. by weight, corresponding to 10 per cent. of phosphoric anhydride P_2O_5, or 35·5 grains in 6 fluid drachms.

6. *A. Sulphuricum Dilutum* = 13·65 per cent. of H_2SO_4, or 49 grains in 6 fluid drachms.

7. *A. Sulphuricum Aromaticum.*—A form of dilute sulphuric acid = 12·5 per cent. of H_2SO_4, or 37·5 grains in 6 fluid drachms; mixed with rectified spirit, cinnamon, and ginger.

8. *A. Sulphurosum.*—A solution of sulphurous acid gas (SO_2) in water = 5 per cent. by weight, or 6·4 per cent. of real sulphurous acid, H_2SO_3. (See Sulphur Group).

C. Inorganic Solid Acids.

1. *A. Arseniosum.*—An anhydride = As_2O_3. (See Arsenic).

2. *A. Boricum.*—A crystalline acid = H_3BO_3.

3. *A. Chromicum.*—An anhydride = C_2O_3.

D. Simple Organic Acids.

1. *A. Aceticum Glaciale.*—Concentrated acetic acid, containing nearly 99 per cent. of real acetic acid, $HC_2H_3O_2$.

2. *A. Aceticum.*—A solution of 33 per cent. of real acetic acid, $HC_2H_3O_2$; or 28 per cent. of $C_4H_6O_3$.

3. *A. Aceticum Dilutum* = 4·27 per cent. of real acetic acid; or 16 grains in 1 fluid ounce.

4. *Acetum—Vinegar.*—An acid liquid containing about 5·41 per cent. of real acetic acid.

5. *A. Citricum.*—A crystalline acid = $H_3C_6H_5O_7,H_2O$.

6. *A. Tartaricum.*—A crystalline acid = $H_2C_4H_4O_6$.

E. Special Organic Acids.

1. *A. Benzoicum.*—A crystalline acid = $HC_7H_5O_2$.
2. *A. Carbolicum.*—A crystalline acid = HC_6H_5O.
3. *A. Carbolicum Liquefactum.*—Carbolic acid liquefied by the addition of 10 per cent. of water.
4. *A. Gallicum.*—A crystalline acid = $H_3C_7H_3O_5,H_2O$.
5. *A. Hydrocyanicum Dilutum—Prussic acid.*—A solution of HCN gas in water = 2 per cent. by weight.
6. *A. Lacticum.*—Lactic acid, $HC_3H_5O_3$, with about 25 per cent. of water.
7. *A. Lacticum Dilutum.*—The preceding diluted with water = 3 fluid ounces in a pint.
8. *A. Meconicum—Meconic acid* = $H_3C_7HO_7$.
9. *A. Oleicum.*—A fluid fatty acid = $HC_{18}H_{33}O_2$.
10. *A. Salicylicum.*—A crystalline acid = $HC_7H_5O_3$.
11. *A. Tannicum.*—A solid acid = $C_{27}H_{22}O_{17}$.

As already stated, many of the preparations just enumerated are more conveniently discussed in other parts of this work; several of them, however, may now be finally disposed of, but it will not be practicable to adhere strictly to the preceding classification. Some of the acids may be considered in groups, according to their action; others must be dealt with individually.

A. Strong Mineral Acids.

The acids commonly recognised in this group are *hydrochloric*, *nitric*, and *sulphuric*, and they may be considered together.

Source and Preparation.—1. *Hydrochloric acid.*—Without describing the details given in the B.P., it

will suffice to state that this acid is prepared by the action of **sulphuric acid,** diluted with **water,** upon **chloride of sodium** in a glass flask, aided by heat. The gas is passed through a wash-bottle to remove all traces of H_2SO_4, and then into a cooled receiver containing distilled water.

$$NaCl + H_2SO_4 = HCl + NaHSO_4.$$

2. *Nitric acid.*—The B.P. merely states, "an acid prepared from **nitrate of potassium** or **nitrate of sodium,** by distillation with **sulphuric acid** and **water.**"

3. *Sulphuric acid.*—This acid is made by a complicated process, which is described at length in works on Chemistry. The B.P. merely states that it is "an acid produced by the combustion of sulphur, and the oxidation and hydration of the resulting sulphurous acid gas by means of nitrous and aqueous vapours."

Characters and Properties.—The chief facts to be remembered under this heading respecting the strong acids may be thus summarized:—

1. In *appearance* they should be colourless and transparent liquids, but are usually more or less coloured from impurities. Sulphuric acid has a somewhat oily consistence.

2. They are intensely acid in taste and reaction.

3. They readily combine with water. Hydrochloric and nitric acids emit pungent and acrid suffocating vapours, combining with the atmospheric moisture. Sulphuric acid absorbs water very rapidly, with condensation and elimination of much heat.

4. They are powerfully corrosive, especially sulphuric acid, which chars and blackens many organic substances.

5. Sp. gr. { *Hydrochloric,* 1·160. *Nitric,* 1·420. *Sulphuric,* 1·843.

6. Neutralizing power :—

Hydrochloric, gr. 114·8
Nitric, gr. 90
Sulphuric, gr. 50
} Neutralize 1000 grain-measures of *Vol. sol. of soda* = 40 grains of NaHO.

7. These acids are dissipated by heat, leaving little or no residue.

Impurities.—1. All the acids are liable to contain fixed impurities, such as earthy matters, and metals.

2. The chief special impurities to which each acid is liable, are as follows :—

a. Hydrochloric.—Sulphuric acid or sulphates; arsenic; sulphurous acid.

b. Nitric.—Hydrochloric acid; sulphuric acid.

c. Sulphuric.—Sulphate of lead; arsenic; nitric acid.

Pharmacy.—The strong acids are ingredients in their several diluted acids, and are employed in making some of their respective salts; they are also contained in the following preparations :—

Hydrochloric in { Liquor Antimonii Chloridi. Liquor Arsenici Hydrochloricus.

Nitric in { Liquor Ferri Pernitratis. Liquor Hydrargyri Nitratis Acidus. Unguentum Hydrargyri Nitratis.

Action.—The strong mineral acids are simply used as **caustics** or **escharotics.** If somewhat diluted they are **vesicants.**

B. Dilute Mineral Acids.

In this division the diluted preparations of the acids just considered will be noticed.

Preparation.—1. The *simple dilute acids* are made by gradually adding distilled water to the strong

acid, in such proportions that in each case the mixture measures a certain bulk when cooled to 60° F., as follows :—

	Acid.		Diluted.
a. Hydrochloric . . .	8	...	$26\frac{1}{2}$
b. Nitric	6	...	31
c. Sulphuric	7	...	$83\frac{1}{2}$

Another method given in the B.P. is to weigh respectively { *Hydrochloric acid*, 3060 grains / *Nitric acid*, 2400 grains / *Sulphuric acid*, 1350 grains } in a glass flask, of the capacity of one pint, then gradually add distilled water until the mixture, after it has been shaken and cooled to 60°, measures a pint.

2. *Acidum Nitro-hydrochloricum Dilutum.*

Add { **Hydrochloric acid,** 4 / **Nitric acid,** 3 } to **distilled water,** 25, and keep the mixture in a glass-stoppered bottle for fourteen days before it is used.

3. *Acidum Sulphuricum Aromaticum.*

a. Mix gradually { **Sulphuric acid,** 3 / **Rectified spirit,** 36.

b. Add { **Spirit of cinnamon,** 2 / **Strong tincture of ginger,** 2.

Characters and Properties.—*a.* These dilute acids are all colourless, except *Acidum sulphuricum aromaticum*, which is deep-red.

b. They present the usual acid taste and other properties.

c. Their sp. gr. and neutralizing power are respectively as follows :—

	Sp. Gr.	Neutralizing Power.
Hydrochloric . .	1·052	In each case 6 fluid drachms require for neutralization 1000 grain-measures of *Vol. solution of soda.*
Nitric	1·101	
Sulphuric . . .	1·094	

	Sp. Gr.	Neutralizing Power.
Nitro-hydrochloric	1·070	6 fluid drachms require about 883 grain-measures.
Aromatic Sulphuric	0·911	195 grains by weight require 500 grain-measures.

PHARMACY.—The several dilute acids are contained in the following preparations:—

Hydrochloric in { Liquor Morphinæ Hydrochloricus. Liquor Strychninæ Hydrochloricus.

Sulphuric in Infusum Rosæ Acidum.

Aromatic Sulphuric in Infusum Cinchonæ Acidum.

ACTION.—The group of dilute mineral acids now under consideration present some individual peculiarities in their actions, but generally they may be summarized as follows:—

1. Applied to the skin or a mucous membrane, they may be, according to their degree of dilution, **irritant, stimulant,** or **astringent.** They will also neutralize alkaline secretions or discharges; and may dissolve certain deposits.

2. Internally they are **refrigerant** when much diluted; and further down the alimentary canal may act as **acids, gastric tonics, anti-peptogens,** or **astringents.** *Sulphuric acid* is used as an **antidote** to lead. *Hydrochloric acid* is given as a **digestant,** being an ingredient of gastric juice. *Nitro-hydrochloric acid* is an **hepatic stimulant.** *Nitric acid* is credited with some special action on the mouth and throat. Remotely the dilute acids are supposed to be **tonics, astringents, alteratives,** and to acidify the urine.

Doses—Dilute Hydrochloric or Nitric Acid, ♏10 to 30. Nitro-hydrochloric Acid, ♏5 to 20. Dilute or Aromatic Sulphuric Acid, ♏5 to 30.

C. Phosphoric Acid.

This acid must be considered separately, and as already intimated, it occurs in the B.P. under two forms, namely:—

1. *Acidum Phosphoricum Concentratum.*
2. *Acidum Phosphoricum Dilutum.*

Source and Preparation:—

1. *Acidum Phosphoricum Concentratum.*—The details given in the B.P. are somewhat complicated, but essentially the process of preparation of this acid is as follows:—

a. Boil { **Phosphorus,** gr. 413 / **Nitric acid,** fl ʒ 6 / **Distilled water,** fl ʒ 8 } in a glass flask, connected with a vertical glass condenser, until the phosphorus has entirely disappeared.

b. Concentrate the fluid until it is reduced to about two fluid ounces, and orange-coloured vapours are no longer formed.

c. Mix with **distilled water** until when cold it measures three fluid ounces, and has a sp. gr. of 1·5.

Phosphoric acid may also be prepared from phosphorus, by treatment of the product of atmospheric oxidation with water and a little nitric acid.

2. *Acidum Phosphoricum Dilutum.*

Mix { **Concentrated phosphoric acid,** 3 / **Distilled water,** 20. }

Diluted phosphoric acid may be prepared from a concentrated acid of any strength other than that described, provided the product have a sp. gr. of 1·08, and respond to the officinal characters and tests.

Characters and Properties:—

1. Both forms of phosphoric acid are colourless liquids; the concentrated preparation has a syrupy consistence.

2. They have a sour taste; and strongly acid reaction.

3. Sp. gr. { Concentrated = 1·5 / Diluted = 1·08.

4. When evaporated, a residue is left, which melts at a low red heat, and upon cooling exhibits a glassy appearance.

Impurities.—The chief of these are certain metals; hydrochloric, nitric, or sulphuric acid; and metaphosphoric acid, which gives a precipitate with solution of albumen.

Quantitative Tests.—73·8 grains of the concentrated, or 355 grains (fl 3 6) of the diluted acid, mixed with 180 grains of oxide of lead in fine powder, leave by evaporation a residue (principally phosphate of lead), which after it has been heated to dull redness, weighs 215·5 grains.

Action.—Phosphoric acid is only used internally, and chiefly as a **refrigerant, gastric tonic,** and **general tonic** or **alterative.** It is believed that it has an **acid** effect on the urine.

Doses—Of concentrated acid, ♏2 to 5; of diluted acid, ♏ 10 to 30. It should be given well-diluted.

D. Dilute Hydrobromic Acid.

This acid requires separate consideration.

Source and Preparation:—

1. Mix { **Bromine,** 1 / **Water,** 15 } in a glass cylinder.

2. Pass a current of **sulphuretted hydrogen gas,** until the red colour of the liquid has disappeared; and filter.

3. Distil; reject the distillate until it is free from the odour of sulphuretted compounds, and then collect it until sulphuric acid begins to distil.

4. Dilute with **distilled water** until it has a sp. gr. of 1·077 at 60°. Preserve in glass-stoppered bottles. More hydrobromic acid may be obtained from the rejected distillate by redistillation.

Characters and Tests:—

1. Dilute hydrobromic acid is a colourless, inodorous liquid.

2. It has a sour taste and acid reaction.

3. It leaves little or no residue on evaporation.

4. Chlorine water liberates bromine, colouring the fluid yellow. It should not become discoloured on keeping.

Impurities.—Sulphuric acid.

Quantitative Test.—S10 grains require for neutralization 1000 grain-measures of *Vol. solution of soda.*

Action.—Hydrobromic acid is believed to have actions similar to those of the bromides (See Bromides), but it is mainly given with quinine or morphia, with the view of preventing the unpleasant after-effects of these drugs.

Dose, ℥15 to 50.

E. Acidum Boricum—Boric or Boracic Acid.

Source and Preparation.—Obtained by the action of **sulphuric acid** on **borax;** and by the purification of native boric acid.

Characters and Properties:—

1. Boric acid occurs in lamellar crystals or irregular masses of crystals, easily powdered, unctuous to the touch.

2. They are colourless and pearly.

3. The taste is feebly sour and bitter, leaving a sweetish after-flavour.

4. Boric acid is soluble in water (1 in 25); boiling water (1 in 3); glycerine (1 in 5); rectified spirit at 60° (1 in 16).

5. It changes the colour of litmus to wine-red. Turmeric paper moistened with an aqueous solution slightly acidified with hydrochloric acid, becomes brownish-red on gently drying, and this colour changes to a greenish if solution of potash be added.

6. The alcoholic solution burns with a flame tinged with green.

7. The crystals liquefy when warmed, and on careful ignition lose 43½ per cent. of their weight, the product solidifying, on cooling, to a brittle glass-like mass.

IMPURITIES.—Sulphate, chloride, lime, metals, soda.

PHARMACY.—*Officinal Preparation*:—

Unguentum Acidi Borici

Boric acid, in fine powder, 1
Soft paraffin, 4
Hard paraffin, 2.

} Melt the paraffins; add the acid, distributed over the surface of the liquid by passing through a sieve; stir till cold.

ACTION.—Boric acid is an important **antiseptic, disinfectant,** and **deodorant.** It is not given internally.

F. Acidum Chromicum—Chromic Acid.

This is an anhydride (not a true acid).

Source and Preparation:—

a. Dissolve { **Bichromate of potassium,** ℥ 30
Sulphuric acid, fl ℥ 50
Water, fl ℥ 42.

b. Set aside for twelve hours, and decant the liquor.

c. Heat the liquor to about 185°; and add **sulphuric acid,** fl ℥ 7, and **water** sufficient to dissolve any crystals of chromic acid that may have been formed.

d. Allow the liquid to cool; collect and drain the crystals; and dry them on porous tiles under 100° in an air-bath. More crystals may be obtained on evaporation.

Characters and Properties:—

1. Chromic acid occurs in crimson acicular crystals, which are very deliquescent and inodorous.

2. It is corrosively caustic to the skin.

3. It is soluble in water, yielding a deep orange-red solution. Mixed with cold alcohol, aldehyd is evolved, and a green residue remains; warmed with hydrochloric acid, chlorine is evolved. In contact with alcohol, glycerine, and some other organic matters, sudden combustion or explosion may ensue.

4. Chromic acid melts at a high temperature, and at a still higher decomposes, with evolution of oxygen, leaving a greenish-black residue.

Impurities.—Sulphuric acid, of which it contains a trace.

Pharmacy.—*Officinal Preparation:*—

Liquor Acidi Chromici = 25 per cent. of chromic anhydride, $CrCO_3$, or nearly 18 grains in fl ℥ 1; 29·5 per cent. of real chromic acid, H_2CrO_4.

Dissolve { Chromic acid, 1
Distilled water, 3.

Orange-red, strongly acid, inodorous, caustic, sp. gr. 1·185.

Action.—Chromic acid is chiefly used as an **escharotic.** Much diluted it is said to be a **cutaneous sedative,** allaying itching.

G. Acetic Acid Group.

This group includes:—

1. *Acidum Aceticum Glaciale—Glacial Acetic Acid.*
2. *Acidum Aceticum—Acetic Acid.*
3. *Acidum Aceticum Dilutum—Diluted Acetic Acid.*
4. *Acetum—Vinegar.*

Source and Preparation:—

1. *Acidum Aceticum Glaciale.*—The preparation of this acid is not given in the B.P., but it is made by distilling anhydrous acetate of soda with sulphuric acid.

2. *Acidum Aceticum.*—The B.P. merely states "an acid liquid obtained from wood by destructive distillation, and subsequently purified."

3. *Acidum Aceticum Dilutum.*

Mix { **Acetic acid,** 1
Distilled water, 7.

4. *Acetum—Vinegar.*—An acid liquid, prepared from a mixture of malt and unmalted grain, by the acetous fermentation.

Characters and Properties.—1. All this group at the ordinary temperature are clear and colourless liquids, except vinegar, which is brown. Glacial acetic acid crystallises when cooled, and remains crystallised until the temperature rises to above 60°.

2. They have a more or less pungent acetous odour; and various degrees of acid taste and reaction, according to their strength.

3. The sp. gr. and neutralizing power of the several acids are as follows:—

	Sp. gr.	Neutralizing power. Grain-measures of volumetric solution of soda.
Strong Acid	1·044	182 grains = 1000.
Glacial Acid	1·058	60 grains = at least 990.
Dilute Acid	1·006	440 grains or fl ʒ 1 = 313.
Vinegar	1·017-9	445·4 grains or fl ʒ 1 = about 402.

4. The glacial acid dissolves camphor, gum, resin, and volatile oil.

Impurities.—1. In the different forms of acetic acid the chief impurities liable to be present are sulphurous, sulphuric, and hydrochloric acids; and metals.

2. Vinegar is allowed by law to have $\frac{1}{1000}$ part of sulphuric acid added, in order to preserve it; beyond this amount it is an adulteration. Metals are also liable to be present.

Pharmacy.—1. *Acetic acid* is used in making some of the officinal acetates or their solutions; and is an ingredient in:—

Acetum Cantharidis.
Extractum Colchici Aceticum.
Oxymel.
Tinctura Ferri Acetatis.

2. *Dilute acetic acid* is contained in:—

Acetum Scillæ, and thus indirectly in:—
Oxymel Scillæ.
Syrupus Scillæ.
Liquor Morphinæ Acetatis.

3. *Glacial acetic acid* is contained in:—

Acetum Cantharidis.
Linimentum Terebinthinæ Aceticum.
Mistura Creasoti.

ACTION.—1. Externally the glacial acetic acid is **escharotic.** According to their strength, the other forms may be **vesicant, rubefacient, astringent,** or **local refrigerant.**

2. Acetic acid is not much used separately as an internal remedy; but much diluted it may be employed as a **refrigerant** or **astringent.**

Dose—Of Diluted Acetic Acid, fl ʒ j to ℥ j.

H. CITRIC ACID. $H_3C_6H_5O_7,H_2O$.

SOURCE AND PREPARATION.—Obtained from *lemon-juice* or *lime-juice*, by the following process:—

1. Heat the juice, O4, to its boiling point. (The albuminous constituents are precipitated).

2. Add **prepared chalk,** ℥ $4\frac{1}{2}$, by degrees, till there is no more effervescence. (Citrate of lime is precipitated).

$$2H_3C_6H_5O_7+3CaCO_3=Ca_32C_6H_5O_7+3H_2O+3CO_2$$

3. Collect the precipitate on a calico filter, and wash it with *hot* water till the filtered liquor passes from it colourless. (Sugar and malate of lime are thus removed).

4. Mix the deposit with **distilled water,** Oj, and gradually add **sulphuric acid,** ℥ $2\frac{1}{2}$, previously diluted with **distilled water,** O$1\frac{1}{2}$. Boil gently for half an hour, keeping the mixture constantly stirred. (Sulphate of calcium is precipitated).

$$Ca_32C_6H_5O_7+3H_2SO_4 = 3CaSO_4+2H_3C_6H_5O_7.$$

5. Separate the solution of citric acid by filtration; wash the insoluble matter with a little distilled water, and add the washings to the solution. Concentrate this solution to density 1·21, allow it to cool, and after 24 hours decant the liquor from

the crystals of sulphate of calcium which will have formed; further concentrate the liquor until a film forms on the surface, and set it aside to cool and crystallise. Purify the crystals, if necessary, by recrystallisation.

CHARACTERS AND PROPERTIES:—

1. Citric acid is crystalline, the primary form being the right rhombic prism.

2. The crystals are transparent and colourless.

3. Citric acid is soluble in $\frac{3}{4}$ its weight of cold water, $\frac{1}{2}$ its weight of boiling water, in rectified spirit (10 in 15) and in glycerine (1 in 2); insoluble in pure ether. The aqueous solution decomposes on keeping, into acetic and carbonic acids, and becomes mouldy.

4. The diluted aqueous solution has an agreeable acid taste.

5. The crystals are decomposed by heat, aconitic acid and a little charred matter being left; but they leave no ash when burnt with free access of air.

IMPURITIES.—Fixed impurities; tartaric acid; oxalic acid; and sulphuric acid.

QUANTITATIVE TEST = POWER OF NEUTRALIZATION.—

a. 70 grains dissolved in distilled water = 1000 grain-measures of *Vol. solution of soda*.

b. For practical purposes it is useful to know the neutralizing power of citric acid with regard to the following officinal salts, as given in the B.P.:—

20 grains of		Grains of Citric Acid.
Carbonate of Ammonium	=	$26\frac{3}{4}$
Carbonate of Potassium	=	17
Bicarbonate of Potassium	=	14
Carbonate of Sodium	=	9·8
Bicarbonate of Sodium	=	16·7

A solution of about 40 grains of citric acid in one ounce of water resembles lemon-juice in strength.

PHARMACY.—1. Citric acid is necessarily present in Succus Limonis; and in Syrupus Limonis, which contains lemon-juice.

2. It is employed in the preparation of all the officinal citrates or their solutions.

3. It is an ingredient in Vinum Quininæ, where it aids materially in dissolving the quinine.

4. Citric acid is much employed in making effervescent draughts.

5. *Incompatibles.*—Tartrate of potassium; alkaline carbonates; acetates; and sulphides.

ACTION.—Citric acid may be given in solution as a **refrigerant,** and is also said to increase the acidity of the urine. It is chiefly used as an ingredient in effervescent draughts.

Dose—gr. 10 to 30.

I. TARTARIC ACID. $H_2C_4H_4O_6$.

SOURCE AND PREPARATION.—Obtained from the acid tartrate of potassium, by a process essentially similar to that by which citric acid is prepared, but with differences in detail.

1. Boil **acid tartrate of potassium,** ℥ 45, with **distilled water,** C2, and gradually add **prepared chalk,** ℥ 12½, constantly stirring. (Tartrate of calcium and tartrate of potassium are formed).

$$2KHC_4H_4O_6+CaCO_3=CaC_4H_4O_6+K_2C_4H_4O_6+CO_2+H_2O.$$

2. When effervescence has ceased, add solution of **chloride of calcium,** ℥ 13½ in O2. (Tartrate of potassium is converted into tartrate of calcium.)

$$K_2C_4H_4O_6+CaCl_2=CaC_4H_4O_6+2KCl.$$

3. When the tartrate of calcium has subsided, pour off the liquid, and wash the tartrate with distilled water until it is rendered tasteless.

4. Decompose the tartrate by mixing it thoroughly with **sulphuric acid,** fl ℥ 13, diluted with **distilled water,** O3, and boiling for half an hour, with repeated stirring.

$$CaC_4H_4O_6 + H_2SO_4 = H_2C_4H_4O_6 + CaSO_4.$$

5. Filter through calico; evaporate the filtrate at a low temperature to sp. gr. 1·21; allow it to cool; and then separate and reject the crystals of sulphate of calcium which have formed. Again evaporate till a film forms, and allow the liquid to cool and crystallise. Purify by solution and recrystallisation.

CHARACTERS AND PROPERTIES:—

1. Tartaric acid is in crystals, the primary form of which is the oblique rhombic prism.

2. They are colourless and transparent.

3. Tartaric acid has a strongly acid taste.

4. It is soluble in water (10 in 8); in rectified spirit (1 in 3). The aqueous solution becomes mouldy on keeping, and acetic acid is formed.

5. Tartaric acid is modified by heat; and leaves no residue, or only a trace, when burned with free access of air.

IMPURITIES.—Lime; metals; oxalic acid.

QUANTITATIVE TEST=POWER OF NEUTRALIZATION.

a. 25 grains dissolved in water = 330 grain-measures of *Vol. solution of soda.*

b. The neutralizing power of tartaric acid with reference to the following is thus given in the B.P.

20 grains of		Grains of Tartaric Acid.
Carbonate of Ammonium	=	$28\frac{3}{4}$
Carbonate of Potassium	=	18
Bicarbonate of Potassium	=	15
Carbonate of Sodium	=	$10\frac{1}{2}$
Bicarbonate of Sodium	=	17·8

PHARMACY.—1. Tartaric acid is not directly employed in any pharmaceutical preparation, but it

is contained in the alkaline tartrates, tartarated antimony, and tartarated iron.

2. This acid was formerly much employed in making effervescent draughts, but its place is now principally taken by citric acid.

3. *Incompatibles.*—Salts of potash, lime, mercury, and lead; vegetable astringents.

ACTION.—Similar to citric acid.

Dose—gr. 10 to 30.

K. LACTIC ACID.

This acid is recognised in two preparations in the B.P., namely:—

1. *Acidum Lacticum—Lactic Acid.*

2. *Acidum Lacticum Dilutum—Diluted Lactic Acid.*

SOURCE AND PREPARATION.—1. *Lactic acid* is produced by the action of a peculiar ferment on solution of sugar, and subsequent purification of the product.

2. *Diluted Lactic Acid.*

Mix { **Lactic acid,** fl ℥ 3.
Distilled water, sufficient to produce O j.

CHARACTERS AND TESTS.—1. *Lactic acid* is a colourless, syrupy liquid, of sp. gr. 1·21. The diluted acid has a sp. gr. 1·040.

2. It is inodorous, with a pure acid taste.

3. It is miscible in all proportions with water, rectified spirit, and ether; nearly insoluble in chloroform.

4. It vaporises when heated, yielding inflammable gases at about 350°; the residue chars, and finally almost entirely disappears.

5. Warmed with permanganate of potassium, lactic acid gives the odour of aldehyd.

IMPURITIES.—Sulphuric or hydrochloric acid; lime; sugar.

QUANTITATIVE TEST.—120 grains of lactic acid, and 800 grains of the diluted acid, require for neutralization 1000 grain-measures of *Vol. solution of soda.*

ACTION.—Lactic acid locally applied is a solvent of diphtheritic "false membrane." Internally it has been used as a **digestant,** and to acidify the urine; it has also some reputation as a remedy for diabetes.

IX. AMMONIUM.

General Summary.—The officinal compounds and preparations of ammonium may be arranged according to the following plan :—

A. **Solutions of Gaseous Ammonia = NH_3, in Water.**

1. *Liquor Ammoniæ Fortior — Strong Solution of Ammonia* = 32·5 per cent. of NH_3, or 15·83 grains in fl 3 1.
2. *Liquor Ammoniæ.—Solution of Ammonia* = 10 per cent. of NH_3, or 5·2 grains in fl 3 1.

B. **Solutions of Salts of Ammonium in Water.**

1. *Liquor Ammonii Acetatis Fortior — Strong Solution of Acetate of Ammonium* = $NH_4C_2H_3O_2$.
2. *Liquor Ammonii Acetatis — "Mindererus' Spirit" — Diluted Solution of Acetate of Ammonium.*
3. *Liquor Ammonii Citratis Fortior — Strong Solution of Citrate of Ammonium* = $(NH_4)_3C_6H_5O_7$.
4. *Liquor Ammonii Citratis—Diluted Solution of Citrate of Ammonium.*
5. *Liquor Bismuthi et Ammonii Citratis.*—A solution of citrate of ammonium and bismuth. (See Bismuth).

C. Salts of Ammonium.

1. *Ammonii Benzoas*=$NH_4C_7H_5O_2$.
2. *Ammonii Carbonas.*—This is considered to be a compound of acid carbonate of ammonium (NH_4HCO_3), with carbamate of ammonium ($NH_4NH_2CO_2$), and the compound molecule is usually regarded as containing one molecule of each of these salts.
3. *Ammonii Bromidum*=NH_4Br. (See Bromine).
4. *Ammonii Chloridum*—*Sal Ammoniac* = NH_4Cl.
5. *Ammonii Nitras*=NH_4NO_3.
6. *Ammonii Phosphas*= $(NH_4)_2HPO_4$.
7. *Bismuthi et Ammonii Citratis*—*Citrate of Bismuth and Ammonium.* (See Bismuth).

D. Special Officinal Preparations.

1. *Linimentum Ammoniæ.*
2. *Spiritus Ammoniæ Aromaticus*—*Aromatic Spirit of Ammonia*—*Sal Volatile.*—A spirituous solution of ammonia, neutral carbonate of ammonium, and oils of nutmeg and lemon.
3. *Spiritus Ammoniæ Fœtidus*—*Fœtid Spirit of Ammonia.*—A spirituous solution of ammonia with oil of asafœtida.

It will be convenient to consider the several compounds of ammonium according to the classification just given.

A. Solutions of Gaseous Ammonia.

Source and Preparation:—

1. *Liquor Ammoniæ Fortior.*—The directions given for the preparation of this compound in the B.P. are somewhat complicated, as regards the apparatus, but the process is essentially as follows:—

a. Gradually heat in an iron bottle, placed in a metal pot surrounded by sand, **chloride of ammonium** in coarse powder, lb. 3, **slaked lime,** lb. 4.

$$2NH_4Cl + Ca2HO = CaCl_2 + 2NH_3 + 2H_2O.$$

b. Pass the liberated gas (NH_3) through a series of tubes and bottles into a flask containing water.

2. *Liquor Ammoniæ.*

Mix { **Strong solution of ammonia,** 1
Distilled water, 2;

preserve in a stoppered bottle.

Characters and Properties.—The two solutions of ammonia have the same properties, only differing in strength.

a. They are colourless liquids.

b. They have a powerful odour of ammonia, and the stronger solution emits pungent fumes.

c. Their taste is acrid.

d. They have a strong alkaline reaction.

e. Sp. gr. { Liq. Amm. Fortior = 0·89.
Liq. Ammoniæ = 0·959.

f. They are entirely dissipated with heat.

Impurities.—Carbonates; lime; metals; sulphides; chlorides; sulphates.

Quantitative Tests.—52·3 grains of Liquor Ammoniæ Fortior, and 170 grains of Liquor Ammoniæ, require for neutralization 1000 grain-measures of *Vol. solution of oxalic acid.*

PHARMACY.—*Liquor Ammoniæ Fortior* is used in making, or is an ingredient in:—

Ammonii Phosphas.
Linimentum Camphoræ Compositum.
Liquor Ammonii Citratis Fortior.
Spiritus Ammoniæ Aromaticus.
Spiritus Ammoniæ Fœtidus.
Tinctura Opii Ammoniata.

Liquor Ammoniæ is contained in:—

Linimentum Ammoniæ.
Tinctura Quininæ Ammoniata.

B. SOLUTIONS OF SALTS OF AMMONIUM.

SOURCE AND PREPARATION:—

1. *Liquor Ammonii Acetatis Fortior.*
   a. Add gradually crushed **carbonate of ammonium** (℥ 17½) to **acetic acid** (about fl ℥ 45); add more of the acid until a neutral liquid results.
   b. Dilute with sufficient water to yield O3.
2. *Liquor Ammonii Acetatis.*

   Mix { **Strong solution of acetate,** 1.
   { **Distilled water,** 5.

3. *Liquor Ammonii Citratis Fortior.*
   a. Neutralize **citric acid,** ℥ 12, with **strong solution of ammonia.**
   b. Add sufficient water to make Oj.
4. *Liquor Ammonii Citratis.*

   Mix { **Strong solution of citrate,** 1
   { **Distilled water,** 4.

(All these preparations are directed to be stored in bottles free from lead).

Characters and Properties.—These solutions have similar properties, the two solutions of the respective salts merely differing in strength.

1. They are colourless liquids.
2. They have no odour; but a saline taste.
3. They are neutral in reaction.
4. Sp.gr. { Liq. Amm. Acet. Fort. = 1·073. / Liq. Amm. Acetatis = 1·022. / Liq. Amm. Citratis Fort. = 1·209. / Liq. Amm. Citratis = 1·062.

C. Salts of Ammonium.

Source and Preparation.—Taking the salts of ammonium (except the *Bromide*) in alphabetical order, the directions given in the B. P. on this point are as follows:—

1. *Benzoate.*—

Dissolve { **Benzoic acid,** ℥ 2 / **Solution of ammonia,** fl ℥ 3 / **Distilled water,** fl ℥ 4 } ;

evaporate, keeping ammonia in slight excess, and set aside that crystals may form.

2. *Carbonate.*—Produced by submitting a mixture of **sulphate** or **chloride of ammonium** and **carbonate of calcium** to sublimation and re-sublimation.

$6NH_4Cl + 3CaCO_3 = N_4H_{16}C_3O_8 + 3CaCl_2 + 2NH_3 + H_2O.$

3. *Chloride.*—May be formed by neutralising **hydrochloric acid** with **ammonia** or **carbonate of ammonium,** and evaporating to dryness. It is usually prepared by sublimation.

4. *Nitrate.*—Neutralise **diluted nitric acid** with **solution of ammonia** or **carbonate of ammonium;** evaporate the solution until crystals are obtained, and keep these fused at a temperature

not exceeding 320°, until the vapour of water is no longer emitted.

5. *Phosphate.*—Add **strong solution of ammonia** to **diluted phosphoric acid,** fl ℥ 20, until the solution is slightly alkaline; evaporate, adding more ammonia from time to time, so as to keep it in slight excess. When crystals are formed, on the cooling of the solution, dry them quickly on filtering paper on a porous tile, and preserve them in a well-stoppered bottle.

CHARACTERS AND PROPERTIES:—

The salts of ammonium have the following properties in common:—

1. They are white or colourless; and crystalline.

2. Their reaction is neutral, except the *carbonate,* which is alkaline.

3. They are volatilised and sublimed by heat, except the *nitrate,* which first fuses at 320°, and is then decomposed at 350° to 450° into nitrous oxide gas (N_2O) and H_2O. This salt is introduced into the B.P. for the purpose of making N_2O.

The other properties of the several salts of ammonium may be arranged in a tabular form:—

Name of Salt.	Crystals.	Solubility.	Odour and Taste.	Changes.
1. *Benzoate.*	Laminar. Colourless.	Water = 1 in 5. Rectified spirit = 1 in 18.	Balsamic odour; like benzoic acid.	None.
2. *Carbonate.*	Crystalline masses. Translucent.	Water = 1 in 4. Sparingly in spirit. Glycerine = 1 in 5. Boiling water dissolves but decomposes it. Freely soluble in acids, with effervescence.	Strongly ammoniacal and pungent odour; acrid taste.	On exposure to air, loses its odour; a white opaque powder forms = acid carbonate.
3. *Chloride.*	Fibrous masses, translucent, tough, and difficult to powder; or minute crystals.	Water = 1 in 3. Rectified spirit = 1 in 55. Glycerine = 1 in 5.	Odourless. Strong, pungent, and saline taste.	None.
4. *Nitrate.*	Confused crystalline masses.	Water = 4 in 3. Spirit = 1 in 11.	Bitter and acrid taste.	Deliquescent.
5. *Phosphate.*	Large prisms. Transparent.	Water = 1 in 2. Insoluble in rectified spirit.	No odour.	On exposure to air, loses water and ammonia, and effloresces, becoming opaque.

Impurities.—The *carbonate* and *nitrate of ammonium* are liable to contain sulphate and chloride.

Quantitative Tests:—

1. *Carbonate.*—52·3 grains dissolved in fl ʒ j of water, are neutralised by 1000 grain-measures of *Vol. solution of oxalic acid.*

20 grains of carbonate of ammonium } neutralise { 26¾ gr. citric acid. / 28¾ gr. tartaric acid.

2. *Phosphate.*—20 grains dissolved in water, and solution of ammonio-sulphate of magnesia added, a crystalline precipitate falls=*Ammonio-phosphate of magnesia*, which when well washed upon a filter with solution of ammonia, diluted with an equal volume of water, dried, and heated to redness, leaves 16·8 grains=*pyro-phosphate of magnesia.*

Pharmacy.—1. *Carbonate of ammonium* is used in the preparation of:—

Bismuthi Carbonas.
Liquor Ammonii Acetatis Fortior.
Spiritus Ammoniæ Aromaticus.

2. *Chloride of ammonium* is used in making Liquor Ammoniæ Fortior; and is an ingredient in Liquor Hydrargyri Perchloridi, for the purpose of aiding solution of the perchloride of mercury.

3. *Incompatibles.*—The chief incompatibles of the salts of ammonium are as follows:—

a. Benzoate.—Acids; persalts of iron; solution of potash.

b. Carbonate.—Acids and acidulous salts; earthy salts; lime-water.

c. Chloride.—Alkalies, alkaline earths, and their carbonates; lead and silver salts.

D. Special Officinal Preparations.

1. *Linimentum Ammoniæ.*—A semi-solid cream.

Mix with agitation until the emulsion can be poured from a bottle, { **Solution of ammonia,** 1 / **Olive oil,** 3.

2. *Spiritus Ammoniæ Aromaticus.*

Carbonate of ammonium, ℥ 4
Strong solution of ammonia, fl ℥ 8
Volatile oil of nutmeg, fl ʒ 4½
Oil of lemon, fl ʒ 6½
Rectified spirit, O 6
Distilled water, O 3.

Distil the oils, spirit, and water to O 7. Distil separately fl ℥ 9. Dissolve the carbonate and solution of ammonia in the latter by gentle heat in a water-bath to 140°, shaking from time to time. Filter, if necessary, when cold, through a little cotton-wool, and gradually mix with the seven pints. The product should measure one gallon.

Characters and Tests:—A colourless liquid; sp. gr. 0·880. One fluid ounce requires for neutralization 558 grain-measures of the *Vol. solution of oxalic acid.* One fluid ounce, after the addition of 330 grain-measures of the test-solution of chloride of barium, should yield, after filtration, a further precipitate when more of the reagent is added.

Pharmacy.—*Aromatic spirit of ammonia* is contained in { Tinctura Guaiaci Ammoniata. / Tinctura Valerianæ Ammoniata.

3. *Spiritus Ammoniæ Fœtidus.*

a. Macerate for 24 hours in a closed vessel, and distil { **Asafœtida** in small pieces ℥ 1½ / **Rectified spirit,** fl ℥ 15.

b. Mix the product with **strong solution of ammonia,** fl ℥ 2, and make up with spirit to O 1.

Characters.—A colourless liquid, but becomes yellow by keeping; sp. gr. about 0·847.

Action of Ammonium Group.

1. As an external application, solution of ammonia acts, according to its strength, as **caustic, vesicant, rubefacient,** or **local stimulant.** It is also an **antidote** to certain animal poisons, as that of wasps or spiders. Chloride of ammonium, applied as a lotion, is used as a **local refrigerant,** or as an **alterative,** to aid the absorption of certain morbid products.

2. Employed by inhalation through the nostrils, solution and carbonate of ammonia are powerful **general stimulants,** being commonly used in the form of "smelling-salts." They are also **sternutatories** and **errhines;** and when properly diluted with air, gaseous ammonia is a **stimulant expectorant.** Chloride of ammonium is used as a spray to the throat and air-passages.

3. As regards their internal administration, the compounds of ammonium have different actions, which may be thus summarized:—

a. All the preparations containing free ammonia or its carbonate, including aromatic and fœtid spirit of ammonia, as well as the solution and carbonate, are **diffusible stimulants,** and **antispasmodics** or **carminatives** in connection with the alimentary canal. They are also useful **direct antacids** in the stomach. The carbonate is a valuable **pulmonary stimulant** and **stimulant expectorant,** a **diaphoretic,** and an **emetic** in large doses. Solution of ammonia is seldom given separately, but it is an ingredient in Ammoniated Tincture of Quinine and Ammoniated Tincture of Opium, and is believed to prevent unpleasant symptoms which are liable to arise from the quinine and opium respectively.

b. The solutions of acetate and citrate of ammonium are **diaphoretic, diuretic,** and **febrifuge.** One or other of them is a common ingredient in "saline mixtures." The solution of acetate in large doses is said to be **emmenagogue.**

c. With respect to special salts of ammonium, the benzoate is **diuretic,** also rendering the urine more acid, **hepatic stimulant,** and **antiseptic.** The chloride has been credited with numerous actions, namely, **diaphoretic, diuretic, alterative, expectorant, hepatic stimulant, emmenagogue;** it is also given in large doses as a remedy for neuralgia. The phosphate is **diuretic** and **hepatic stimulant.** The nitrate is not used medicinally.

Doses—The doses of the several salts and preparations of ammonium which are administered internally are as follows :—

Benzoate, gr. 10 to 20.
Carbonate, gr. 3 to 10; as an emetic, gr. 20.
Chloride, gr. 5 to 20.
Phosphate, gr. 5 to 20.
Strong Solution of Acetate, ♏ 25 to 75.
Solution of Acetate, fl ʒ 2 to 6.
Strong Solution of Citrate, fl ʒ ½ to 1½.
Solution of Citrate, fl ʒ 2 to 6.
Aromatic Spirit of Ammonia } fl ʒ ½ to 1.
Fœtid Spirit of Ammonia }

X. POTASSIUM.

General Summary.—The compounds and preparations of Potassium recognised in the B.P. are very numerous, but they may be thus classified:—

1. Forms of Potash.

- *a. Potassa Caustica—Caustic Potash—Hydrate of Potassium* = KHO, containing some impurities.
- *b. Liquor Potassæ—Solution of potash.* A solution of hydrate of potassium = 5·84 per cent. by weight, or 27 grains in fl ʒ 1.

2. Inorganic Salts.

- *a. Potassii Bicarbonas—Bicarbonate of Potassium* = $KHCO_3$.
- *b.* ,, *Bichromas—Bichromate of Potassium* = K_2CrO_4, CrO_3.
- *c.* ,, *Bromidum—Bromide of Potassium* = KBr. (See Bromine).
- *d.* ,, *Carbonas — Carbonate of Potassium* = K_2CO_3, with about 16 per cent. of water of crystallisation.
- *e.* ,, *Chloras — Chlorate of Potassium* = $KClO_3$.
- *f.* ,, *Ferrocyanidum—Ferrocyanide of Potassium* = $K_4FeC_6N_6$, $3H_2O$.
- *g.* ,, *Iodidum—Iodide of Potassium* = KI. (See Iodine).
- *h.* ,, *Nitras—Nitrate of Potassium. Nitre* or *Saltpetre* = KNO_3.
- *i.* ,, *Permanganas — Permanganate of Potassium* = $KMnO_4$.
- *j.* ,, *Sulphas — Sulphate of Potassium* = K_2SO_4.
- *k. Potassa Sulphurata—Sulphurated Potash.* (See Sulphur).

3. **Organic Salts.**
   - *a. Potassii Acetas*—*Acetate of Potassium* = $KC_2H_3O_2$.
   - *b.* ,, *Citras*—*Citrate of Potassium* = $K_3C_6H_5O_7$.
   - *c.* ,, *Cyanidum*—*Cyanide of Potassium* = KCN.
   - *d.* ,, *Tartras*—*Tartrate of Potassium*—*Soluble Tartar* = $K_2C_4H_4O_6,H_2O$.
   - *e.* ,, *Tartras Acida*—*Acid Tartrate of Potassium*—*Cream of Tartar* = $KHC_4H_4O_6$.
   - *f. Soda Tartarata*—*Tartrate of Potassium and Sodium.* (See SODIUM).

4. **Special Officinal Preparations.**
   - *a. Argenti et Potassii Nitras*—*Nitrate of Silver and Potassium*—*Mitigated Caustic.* (See ARGENTUM).
   - *b. Linimentum Potassii Iodidi cum Sapone.* (See IODINE).
   - *c. Liquor Arsenicalis.* (See ARSENIUM).
   - *d. Liquor Potassæ Effervescens*—*Potash Water.*
   - *e. Liquor Potassii Permanganatis*—*Solution of Permanganate of Potash*—*Condy's fluid.*
   - *f. Trochisci Potassii Chloratis.*
   - *g. Unguentum Potassii Iodidi.* (See IODINE).
   - *h. Unguentum Potassæ Sulphuratæ.*

5. **Soap.**
   - *Sapo Mollis*—*Soft Soap.* Soap made with potash and olive oil.

Some of the preparations just enumerated are discussed in other parts of this work; the remainder will now be considered, mainly according to the classification given above.

A. Forms of Potash.

1. *Liquor Potassæ.*—Preparation.—The process of making this solution is essentially as follows:—

a. Heat to the boiling point { **Carbonate of potassium,** ℔ i **Distilled water,** C i.

b. Gradually mix washed **slaked lime,** ℥ 12, and boil for 10 minutes, with constant stirring.

c. After subsidence of the insoluble matter, transfer the clear supernatant liquor by means of a siphon to a green glass bottle, with an air-tight stopper, and add distilled water, if necessary, to make the solution of proper strength.

$$K_2CO_3 + Ca2HO = CaCO_3 + 2KHO.$$

Characters and Properties:—

a. Liquor potassæ is a colourless liquid; sp. gr. =1·058.

b. It has a strongly alkaline reaction.

c. The taste is intensely acrid and caustic.

d. It readily attracts CO_2 from the air; and dissolves lead from white glass bottles.

Impurities.—Carbonic acid, lime, sulphates, chlorides, and alumina.

Quantitative Test.—462·9 grains (fl ℥ j) require for neutralization 482 grain-measures of *Vol. solution of oxalic acid.*

Pharmacy.—1. Solution of Potash is used in the preparation of Caustic Potash, and of the Bromide and Iodide of Potassium.

2. *Incompatibles.*—Acids, acidulous salts, preparations of ammonia, metallic salts, preparations of belladonna, stramonium, and hyoscyamus.

2. *Potassa Caustica.*—Preparation.—Boil down **solution of potash** rapidly in a silver or clean iron vessel, until it becomes of oily consistence, and a

drop removed on a warm glass rod solidifies on cooling. Pour into moulds; and when solidified and still warm put into stoppered bottles.

CHARACTERS AND PROPERTIES:—

a. Caustic potash is in hard white pencils or cakes.

b. It is very deliquescent.

c. It is readily soluble in water (2 in 1), and alcohol.

d. The reaction is powerfully alkaline.

e. Caustic potash is corrosive; and dissolves animal tissues.

QUANTITATIVE TEST.—56 grains dissolved in water leaves only a trace of sediment, and requires for neutralization at least 900 grain-measures of *Vol. solution of oxalic acid.*

PHARMACY.—Caustic potash is used in making Potassii Permanganas.

B. SALTS OF POTASSIUM.

Excluding the salts of potassium discussed elsewhere (Bromide, Iodide, and Sulphurated Potash), the remainder will now be considered together.

SOURCE AND PREPARATION.—In three instances the salts of potassium are merely purified, being either found native (nitrate), or produced artificially during certain processes (carbonate, acid tartrate). A large number of them are prepared from the carbonate, and a few are obtained from other sources. They may be considered according to their alliances, in the following order:—

1. *Carbonate.*—Obtained from commercial **pearl-ash,** the product of lixiviation of wood-ashes, by treating it with its own weight of distilled water, and evaporating the solution just to dryness, while it is kept briskly agitated.

2. *Bicarbonate.*—This salt may be obtained by saturating a strong solution of **carbonate of potassium** with **carbonic acid gas,** and re-crystallising the separated salt.

$$K_2CO_3+H_2O+CO_2=2KHCO_3.$$

3. *Bichromate.*—No directions are given in the B.P. for the preparation of this salt, but it may be stated that it is made by roasting **chrome iron ore** with a mixture of **carbonate of potassium** and **chalk** in a furnace, through which a current of air passes. Yellow chromate of potassium is thus formed, which is treated with **sulphuric acid,** when the red chromate is produced.

4. *Chlorate.*—The details of the preparation of this salt given in the B.P. are somewhat complicated, but essentially it consists of the following parts:—

a. Pass **chlorine gas** into a mixture of

{ **Carbonate of potassium,** ℥ 20
{ **Slaked lime,** ℥ 53

triturated with water, so as to be slightly moist, contained in a large carboy.

b. Boil with water, Oj, for twenty minutes; filter, evaporate till a film forms on the surface, and set aside to cool and crystallise. Purify by dissolving in boiling water, and re-crystallisation.

$$K_2CO_3+6CaH_2O_2+6Cl_2=2KClO_3+5CaCl_2+CaCO_3+6H_2O.$$

5. *Sulphate.*—The preparation of this salt is not alluded to in the B.P., but it is made by neutralising with **carbonate of potassium** the acid sulphate left in the manufacture of nitric acid.

6. *Acetate.*—*a.* Add **carbonate of potassium,** ℥ 20, gradually to **acetic acid,** O2.

$$K_2CO_3+2HC_2H_3O_2=2KC_2H_3O_2+H_2O+CO_2.$$

b. Filter; acidulate if necessary with a few additional drops of acid; evaporate to dryness in a porcelain basin; liquefy cautiously by heat; allow the basin to cool, and when the salt has

solidified, and while still warm, break it into fragments, and put it into stoppered bottles.

7. *Citrate.*—*a.* Gradually add **carbonate of potassium,** ℥ 8, to a solution of **citric acid,** ℥ 6 in O2, and if the solution be not neutral, make it so by the cautious addition of more acid or carbonate.

b. Filter; evaporate to dryness, stirring constantly after a pellicle has begun to form, till the salt granulates.

c. Triturate in a dry warm mortar; and preserve the powder in stoppered bottles.

8. *Ferrocyanide.*—A salt obtained by fusing animal substances, such as the cuttings of horns, hoofs, and skins, with **carbonate of potassium** and **iron,** in an iron pot, lixiviating the crude product with water, and purifying the salt by crystallisation.

9. *Cyanide.*—May be obtained by heating **ferrocyanide of potassium** at a red heat until gas ceases to be evolved, allowing the sediment to subside in the still molten mass, and pouring off the clear liquid. It may be purified, if necessary, by solution in and crystallisation from spirit.

10. *Nitrate.*—Nitrate of potassium of commerce purified, if necessary, by crystallisation from solution in distilled water.

11. *Acid Tartrate.*—An acid salt obtained from the crude tartar which is deposited during the fermentation of grape-juice, and from the lees of wine.

12. *Tartrate.*—*a.* Gradually add **acid tartrate of potassium,** ℥ 20, to a boiling solution of **carbonate of potassium,** ℥ 9 in O2½, and boil for a few minutes. If the liquid is not then neutral, it must be made so by careful addition of more carbonate or acid tartrate.

$$2KHC_4H_4O_6 + K_2CO_3 = 2K_2C_4H_4O_6 + CO_2 + H_2O.$$

b. Filter; concentrate till a pellicle forms; set aside to cool and crystallise; evaporate for more

crystals; drain, and dry the crystals by exposure to air in a warm place. Preserve in a stoppered bottle.

13. *Permanganate.*—This salt is made by a complicated process, of which the following are the several steps:—

a. Mix in fine powder { **Chlorate of potassium,** ℥ 3½ ; **Black oxide of manganese,** ℥ 4 }; add { **Caustic potash,** ℥ 5 ; **Distilled water,** fl ℥ 4 } to these in a porcelain vessel; and evaporate to dryness on a sand-bath, stirring diligently.

b. Pulverise the residual mass; place the powder in a covered crucible, and expose it to a dull red heat for an hour, or until it is semi-fused. (*Manganate of potash* is formed).

$$6KHO + 3MnO_2 + KClO_3 = 3K_2MnO_4 + KCl + 3H_2O.$$

c. Cool; pulverise; and boil with O 1½ of water. Let the insoluble matter subside, decant the fluid, boil again with O½ of water, again decant, saturate the united liquors with **carbonic acid,** and evaporate till a pellicle forms. (*Permanganate* is thus formed).

d. Set aside to cool and crystallise. Drain the crystalline mass, boil it in water, ℥ 6, and strain through a funnel, the throat of which is lightly obstructed by a little asbestos. Let the fluid cool and crystallise, drain, and dry the crystals by placing them under a bell-jar over a vessel containing sulphuric acid.

Characters and Properties.—The salts of potassium may be conveniently tabulated under two divisions, as regards their characters and properties, according to the following arrangement:—

A. **White or Colourless Salts.**—These are all *crystalline*, but the *carbonate*, *citrate*, *tartrate*, and often the *acid tartrate* are in a powdery or granular form, the crystals being very small. They are inodorous.

Name of Salt.	Crystals.	Reaction.
1. *Acetate.*	Foliaceous and satiny masses.	Neutral.
2. *Bicarbonate.*	Right rhombic prisms. Large; transparent.	Neutral. Not corr
3. *Carbonate.*	A crystalline powder; white and rather opaque.	Alkaline, and some caustic.
4. *Chlorate.*	Rhomboidal plates or tabular crystals; 4- or 6-sided; transparent.	Neutral.
5. *Citrate.*	A crystalline powder.	Neutral.
6. *Cyanide.*	White opaque crystalline masses.	Alkaline.
7. *Nitrate.*	In crystalline masses or fragments of striated six-sided prisms; white and opaque.	Neutral.
8. *Sulphate.*	Six-sided prisms, terminated by six-sided pyramids. Transparent; very hard.	Neutral.
9. *Tartrate.*	Small; 4- or 6-sided prisms; colourless.	Neutral.
10. *Acid Tartrate.*	A gritty white powder; or fragments of cakes, crystallised on one surface.	Acid.

Taste.	Solubility.	Changes.
e.	Very soluble in water and rectified spirit.	Very deliquescent.
e, and feebly alka-	Cold water (1 in 3). Boiling water (1 in 1). Insoluble in alcohol.	Not deliquescent. When heated, carbonate is left.
gly alkaline and stic.	Readily in water (1 in $\frac{3}{4}$). Insoluble in alcohol.	Very deliquescent. Loses 16 per cent. of weight with red heat.
and saline.	Sparingly in cold water (1 in 16); boiling water (1 in 2).	Fuses with heat; gives off O, and KCl remains.
y acid and saline.	Very soluble in water (10 in 6). Insoluble in spirit.	Deliquescent.
and taste like rocyanic acid.	Readily in water; sparingly but almost entirely in absolute alcohol.	Deliquescent.
ar, cool and saline.	Cold water (1 in 4). Boiling water (1 in $2\frac{1}{2}$). Sparingly in alcohol.	Melts with heat, and is cast into moulds=*Sal prunella*. Thrown on the fire it deflagrates.
and saline.	Cold water (1 in 10). Boiling water (1 in 4). Insoluble in alcohol.	Not deliquescent. Decrepitates strongly when heated.
saline, and bitter-	Water (10 in 8) (named *Soluble tartar*). Insoluble in alcohol.	Somewhat deliquescent. Decomposed by heat.
nt, acid.	Cold water (1 in 200). Boiling water (1 in 16). Insoluble in alcohol.	Heat evolves an odour of burnt sugar; a black residue remains.

B. Coloured Crystalline Salts.

Name of Salt.	Crystals.	Odour and Taste.	Solubility.	Changes.
1. *Bichromate.*	Large, red, four-sided tables; transparent.		Water (1 in 10).	Fuses and is decomposed by heat.
2. *Ferrocyanide.*	Large; yellow.		Water (1 in 4). Insoluble in alcohol.	Permanent in the air.
3. *Permanganate*	Slender, prismatic; dark purple.	No odour. Sweetish and astringent taste.	Water (1 in 16). Solution has a rich purple colour.	When heated, it decrepitates, O is evolved, and a black residue remains.

Impurities.—The chief of these are as follows:—

a. Acetate.—Metallic impurities.

b. Carbonate.—Traces of silica, sulphate, and chloride are usually present.

c. Chlorate.—Chlorine, chloride, lime.

d. Cyanide.—Sulphate.

e. Nitrate.—Sulphates and chlorides.

f. Sulphate.—Lime.

Quantitative Tests.—These may be divided into two groups, namely:—

1. **Power of Neutralization.**

Grain-measures of Vol. sol. of oxalic acid.

a. Bicarbonate—50 grains, exposed to a low red heat, leave 34½ grains of a white residue = carbonate } = 500

b. Carbonate—83 grains = at least 980

c. Citrate—102 grains = 1000

d. Tartrate—122 grains = 990

e. Acid Tartrate—204 grains = at least 1000.

In the last three instances, the salts are directed to be heated to redness till gases cease to be

evolved, and the alkaline residue to be treated with distilled water, filtered, and well washed.

2. **Special Tests.**

a. Cyanide.—10 grains dissolved in an ounce of water require about 730 grain-measures of *Vol. solution of nitrate of silver* to be added before a permanent precipitate begins to form = about 95 per cent. of real cyanide of potassium.

b. Permanganate.—5 grains dissolved in water require for complete decoloration a solution of 44 grains of granulated sulphate of iron, acidulated with fl 3 2 of diluted sulphuric acid.

PHARMACY.—1. *Officinal preparations.*—Those of the salts of potassium not considered elsewhere, are as follows:—

a. Liquor Potassæ Effervescens.

Dissolve { Bicarbonate of potassium, gr. 30
Distilled water, O1.

Filter; and force in as much pure washed CO_2 gas as can be introduced by pressure of about 4 atmospheres.

b. Liquor Potassii Permanganatis. Intense purple.

Dissolve { Permanganate of potassium, gr. 88
Distilled water, O1.

c. Trochisci Potassii Chloratis = gr. 5 in each. Made in the ordinary way with refined sugar, gum arabic, mucilage, and water.

2. The other preparations in which the compounds of potassium are contained, or in making which they are used, are as follows:—

a. Bichromate.—Used in making Acidum Chromicum and Sodii Valerianas.

b. Carbonate is contained in:—

Decoctum Aloes Compositum.
Enema Aloes.
Liquor Arsenicalis.
Mistura Ferri Composita.

It is also used in making Atropina and Bismuthum Purificatum.

c. Cyanide.—Used in making Bismuthum Purificatum.

d. Ferrocyanide.—Used in making Acidum Hydrocyanicum Dilutum.

e. Sulphate is contained in:—

Pilula Colocynthidis Composita.
Pilula Colocynthidis et Hyoscyami.
Pulvis Ipecacuanhæ Compositus.

f. Acid Tartrate is an important ingredient in:—

Confectio Sulphuris.
Pulvis Jalapæ Compositus.

Also used in preparing Acidum Tartaricum, Antimonium Tartaratum, and Ferrum Tartaratum.

Action of Potassium Group.

The action of the compounds and preparations of potassium may be summarized in the following way, excluding those which are considered in other connections, and those which are not used for medicinal purposes:—

1. *External and local applications.*—Caustic potash is simply a powerful **caustic** or **escharotic.** Solution of potash is a mild **caustic,** acting upon epithelial structures, such as the nails, corns, or warts. When much diluted it acts as a **detergent**, especially for the removal of epithelium and thickened sebaceous secretion; a **local sedative,** relieving itching; and an **antacid.** The carbonate and bicarbonate of potassium in solution have similar actions.

Solutions of some of the preparations of potassium, especially the citrate, have been recommended as applications to rheumatic or gouty

joints. The nitrate and chlorate in solution are **local refrigerants;** and the chlorate is believed to have almost a specific effect as a local remedy in certain affections of the mouth and throat. Permanganate is a most valuable **antiseptic, disinfectant,** and **deodorant,** and is extensively used in the form of the solution—Condy's fluid. The cyanide is a **cutaneous sedative** and **anodyne.**

2. *Internal action.*—In discussing this part of the subject, it will be expedient to take some of the preparations of potassium in groups, others individually. It may at the outset be stated generally that the prolonged use of these preparations is liable to produce a marked depressant effect upon muscular and nervous tissues.

a. Solution of potash, the carbonate, and the bicarbonate are **direct antacids** in the stomach, **gastric sedatives,** and **peptogens.** They also act as **antidotes** to acids and certain other poisons. After absorption they supply potash to the blood and tissues when deficient; and become **remote antacids** or **alkalizers, diuretics, alteratives,** and **expectorants,** increasing the amount and diminishing the viscidity of the bronchial secretion. Potash-water is a pleasant preparation, having more or less similar actions, but is chiefly used for its effects on the stomach.

b. The chlorate is given internally for its effects on the mouth and throat, and is also a **diuretic.** It has been supposed that this salt is decomposed in the system, and that oxygen gas is liberated.

c. Nitrate of potassium is a **diuretic, diaphoretic, febrifuge,** and **vascular sedative** in large doses. The smoke arising from burning nitre-paper is inhaled as a **pulmonary sedative** in asthmatic attacks.

d. Sulphate is a **saline aperient,** but is not much employed medicinally.

e. Permanganate of potassium may be employed internally as an **antiseptic**; and is also supposed to be an **emmenagogue.**

f. The vegetable salts of potassium have this property in common, namely, that after absorption into the blood they are decomposed, and become converted into the carbonate. In connection with the alimentary canal they are all more or less **refrigerant,** and the acetate, tartrate, and acid tartrate are **saline aperients**; the acid tartrate in combination with jalap in compound jalap powder produces abundant watery stools. After absorption they become **remote antacids, diuretics,** and the citrate is **diaphoretic.** The citrate is the salt commonly used if it is desired to alkalinise the blood or urine for any length of time, and it may thus act as a **lithontriptic.** The acetate of potassium is much employed as a **diuretic.**

Doses—Solution of Potash, ♏ 15 to 60, well-diluted.
Bicarbonate, gr. 10 to 40.
Carbonate, gr. 10 to 30.
Chlorate, gr. 10 to 30.
Nitrate, gr. 10 to 30.
Permanganate, gr. 1 to 5.
Sulphate, gr. 15 to 60.
Acetate, gr. 10 to 60.
Citrate, gr. 20 to 60.
Tartrate, gr. 60 to ʒ ½.
Acid Tartrate, gr. 20 to 60.
Effervescent Solution of Potash, ʒ 5 to 10.
Solution of Permanganate, fl ʒ 2 to 4.

XI. SODIUM.

General Summary.—A similar plan of arrangement of the numerous officinal compounds and preparations of Sodium may be adopted as in the case of Potassium.

1. **Sodium** = Na. The metallic element.

2. **Forms of Soda.**
   - *a. Soda Caustica—Caustic Soda—Hydrate of Sodium*, NaHO, with some impurities.
   - *b. Liquor Sodæ—Solution of Soda* = 18·8 grains of *Hydrate of Sodium* in fl ʒ 1, or 4 per cent. by weight.

3. **Inorganic Salts of Sodium.**
   - *a. Sodii Arsenias—Arseniate of Sodium* (*See* Arsenium).
   - *b.* ,, *Bicarbonas — Bicarbonate of Sodium* = $NaHCO_3$.
   - *c.* ,, *Bromidum—Bromide of Sodium* = NaBr. (*See* Bromine.)
   - *d.* ,, *Carbonas — Carbonate of Sodium* = Na_2CO_3, $10H_2O$.
   - *e.* ,, *Carbonas Exsiccata — Dried Carbonate* = Na_2CO_3.
   - *f.* ,, *Chloridum — Chloride of Sodium* = NaCl.
   - *g.* ,, *Hypophosphis—Hypophosphite of Sodium.* (*See* Phosphorus).
   - *h.* ,, *Iodidum—Iodide of Sodium* = NaI. (*See* Iodine).
   - *i.* ,, *Nitras—Nitrate of Sodium* = $NaNO_3$.
   - *j.* ,, *Phosphas — Phosphate of Sodium* = Na_2HPO_4, $12H_2O$.
   - *k.* ,, *Sulphas—Sulphate of Sodium* = Na_2SO_4, $10H_2O$.
   - *l.* ,, *Sulphis—Sulphite of Sodium* = Na_2SO_3, $7H_2O$. (*See* Sulphur).
   - *m. Borax—Pyroborate of Sodium* = $Na_2B_4O_7$, $10H_2O$.

4. Organic Salts of Sodium.

- *a. Soda Tartarata—Tartarated Soda—Tartrate of Potassium and Sodium — Rochelle Salt* = $NaKC_4H_4O_6.4H_2O$.
- *b. Sodii Citro-Tartras Effervescens—Effervescent Citro-Tartrate of Sodium.* An aggregation of bicarbonate of sodium with citric and tartaric acids, and refined sugar.
- *c.* „ *Salicylas—Salicylate of Sodium*—$(NaC_7H_5O_3)_2$, H_2O.
- *d.* „ *Sulpho-carbolas — Sulpho-carbolate of Sodium* = $NaC_6H_5SO_4$, $2H_2O$.
- *e.* „ *Valerianas — Valerianate of Sodium* = $NaC_5H_9O_2$.

5. Special Officinal Preparations.

- *a. Liquor Sodæ Effervescens—Soda Water.*
- *b. Liquor Sodii Arseniatis.* (*See* ARSENIUM).
- *c. Liquor Sodii Ethylatis—Solution of Ethylate of Sodium*=19 per cent. of the solid salt, NaC_2H_5O.
- *d. Liquor Sodii Chlorinatæ.* (*See* CHLORINE).
- *e. Cataplasma Sodii Chlorinatæ.* (*See* CHLORINE).
- *f. Glycerinum Boracis.*
- *g. Mel Boracis.*
- *h. Trochisci Sodii Bicarbonatis*=gr. 5 in each.

6. Soaps.

- *a. Sapo Animalis—Curd Soap.*
- *b. Sapo Durus—Hard Soap.*

A. Sodium.

The metallic element sodium as met with in commerce. It should be preserved in well-stoppered bottles under mineral naphtha.

Characters.—A soft metal, rapidly oxidising in the air, but showing a bright metallic surface when freshly cut. It attacks water or alcohol with evolution of hydrogen gas, little or no insoluble matter remaining.

Quantitative Test.—23 grains, cautiously dissolved in water, requires for neutralization at at least 975 grain-measures of *Vol. solution of oxalic acid.*

Pharmacy.—Sodium is introduced into the B.P. for the preparation of Liquor Sodii Ethylatis.

B. Forms of Soda.

1. *Liquor Sodæ.*—This solution is prepared by the action of **slaked lime,** ℥ 12, on a boiling solution of **carbonate of sodium,** ℥ 28 in C1, by a process similar to that by which Liquor Potassæ is made, to which the student is referred for details.

Characters.—A clear, alkaline liquid, of sp. gr. 1·047.

Impurities.—Carbonic acid; lime; magnesia; usually a trace of sulphate and chloride.

Quantitative Test.—458 grains (fl ℥ i) require for neutralization 470 grain-measures of *Vol. solution of oxalic acid.*

Pharmacy.—Solution of soda is used in the preparation of Sulphurated Antimony.

2. *Soda Caustica.*—Preparation.—From **solution of soda,** by a similar process to that by which caustic potash is made from solution of potash.

Characters and Properties.—Caustic soda very much resembles caustic potash, but presents the following differences :—

a. It is most frequently in whitish or greyish-white fragments or cakes, but may be cast into sticks, like those of caustic potash.

b. It is less deliquescent; and less caustic.

Quantitative Tests.—40 grains dissolved in water require for neutralization about 900 grain-measures of *Vol. solution of oxalic acid.*

Impurities—Chloride; sulphate.

C. Salts of Sodium.

These may be discussed together, omitting the several salts which are described in other connections, namely Arseniate, Bromide, Hypophosphite, Iodide, and Sulphite.

Source and Preparation.—In considering this part of the subject, the salts of sodium may be taken in the following order :—

1. *Chloride.*—The preparation of this salt is not mentioned in the B.P., but it is obtained by the evaporation of sea-water or spring-water, or of solution of rock salt.

2. *Carbonate.*—This salt is commonly obtained from **chloride of sodium,** either by reaction with **bicarbonate of ammonium** and subsequent ignition; or by conversion into sulphate, and action of heat on a mixture of the **sulphate** with **carbon** and **carbonate of calcium.**

3. *Dried Carbonate.*—Expose **carbonate of sodium,** ℥ 8, in a porcelain capsule to heat applied gently until the crystals crumble to powder; then increase the temperature, and continue the action until vapours cease to be evolved. The product

weighs about ℥ 3. Rub it to powder, and enclose in a stoppered bottle.

4. *Bicarbonate.*—A salt obtained by saturating **carbonate of sodium** with **carbonic acid,** or by reaction of **chloride of sodium** and **bicarbonate of ammonium.**

5. *Borax.*—A native salt. It is also made artificially by boiling together, in proper proportions, **boric acid** and **carbonate of sodium.**

6. *Nitrate.*—A native salt (Peruvian or Chilian nitre) purified by crystallisation from water.

7. *Phosphate.*—This salt may be obtained by adding a solution of **carbonate of sodium** to a solution of **acid phosphate of calcium,** prepared from a mixture of bone-ash and sulphuric acid.

8. *Sulphate.*—May be obtained from the residue left in the manufacture of HCl from NaCl (**acid sulphate of sodium**=$NaHSO_4$), by neutralizing it with **carbonate of sodium,** and crystallising from solution in water.

$$2NaHSO_4 + Na_2CO_3 = 2Na_2SO_4 + H_2O + CO_2.$$

9. *Effervescent Citro-Tartrate.*—

a. Powder, mix thoroughly, and heat to between 200° and 202°

Bicarbonate of sodium, 17
Tartaric acid, 9
Citric acid, 6
Refined sugar, 5.

b. When the particles of the powder begin to aggregate, stir assiduously until they assume a granular form. Separate by suitable sieves the granules of uniform and most convenient size, and preserve in well closed bottles.

10. *Tartarated Soda.*—*a.* Add gradually **acid tartrate of potassium,** ℥ 16, to a boiling solution of **carbonate of sodium,** ℥ 12 in O4, boil for a few minutes, and if required add one or other salt till a neutral solution is obtained.

$$2KHC_4H_4O_6 + Na_2CO_3 = 2KNaC_4H_4O_6 + H_2O + CO_2.$$

b. Boil and filter; concentrate by evaporation; and crystallise.

11. *Salicylate.*—Obtained by the action of **salicylic acid** on **carbonate of sodium** or **caustic soda.**

12. *Sulphocarbolate.* — Obtained by dissolving **carbolic acid** in excess of **sulphuric acid,** supersaturating the liquid with **carbonate of barium,** filtering, and treating the filtrate with **carbonate of sodium** until no further precipitate forms. The filtrate from this mixture yields crystals of sulphocarbolate of sodium on evaporation.

13. *Valerianate.*—In making this salt, valerianic acid is first prepared by oxidation of amylic alcohol (fousel oil), and the acid is neutralized by solution of soda. The steps of the process are essentially as follows:—

a. Distil until about half a gallon has passed over into the condenser, a mixture of **Sulphuric acid,** fl ℥ 6½; **Water,** fl ℥ 10; **Bichromate of potassium,** ℥ 9; **Water,** O 3½; **Amylic alcohol,** fl ℥ 4. Dissolved with gentle heat.

b. Saturate the distilled liquid accurately with **solution of soda;** remove any oily fluid which floats on the surface; evaporate till watery vapour ceases to escape; and then raise the heat cautiously, so as to liquefy the salt.

c. When the product has cooled and solidified, break it into pieces, and immediately put it into a stoppered bottle.

Characters and Properties. — The salts of sodium are all white or colourless. With regard to their other characters they may be conveniently arranged under two divisions, according to the following plan:—

A. **Crystalline Salts.**—The chief properties of this group may be exhibited in tabular form. (See pages 142 and 143).

B. **Non-Crystalline Salts.**—These include:—

1. *Dried Carbonate.*—A white powder; its other characters being similar to those of the carbonate.

2. *Bicarbonate.*—In powder or small opaque irregular scales; of a saline, slightly alkaline taste, not caustic or unpleasant; soluble in water (1 in 10).

3. *Effervescent Citro-Tartrate.*—In white grains; soluble in water with effervescence.

4. *Valerianate.*—This salt is in dry white masses, without alkaline reaction; entirely soluble in rectified spirit; and giving out a powerful odour of valerian on the addition of dilute sulphuric acid.

Impurities.—The chief impurities liable to be found in the salts of sodium are potash, sulphates, and chlorides.

Quantitative Tests.—These may be considered on the same plan as in the case of potassium.

a. **Power of Neutralization.**

	Grain-measures of Vol. solution of oxalic acid.
(i) Bicarbonate, 84 grains, exposed to red heat, leave 53 grains of alkaline residue = carbonate	= 1000
(ii) Carbonate, 143 grains (iii) Dried Carbonate, 53 grains	= 960
(iv) Tartarated Soda, 141 grains, heated to redness till gases cease to be evolved, leave an alkaline residue = carbonate	= 1000

b. **Special Test.**—*Sulphate.*—100 grains dissolved in distilled water and acidulated with hydrochloric acid, give, by the addition of chloride of barium, a white precipitate, which, when washed and dried, weighs 72·2 grains.

Name of Salt.	Crystals.	Reaction.
1. *Borax.*	Large 6-sided prisms, flattened; colourless and transparent.	Weak alkaline.
2. *Carbonate.*	Laminar crystals of rhombic shape; colourless and transparent.	Strong alkaline.
3. *Chloride.*	Small, white, crystalline grains; or transparent cubic crystals.	Neutral.
4. *Nitrate.*	Obtuse rhombohedra; colourless.	Neutral.
5. *Phosphate.*	Large rhombic prisms, terminated by four converging planes; transparent and colourless.	Faintly alkaline.
6. *Sulphate.*	6-sided oblique rhombic prisms; transparent.	Neutral.
7. *Salicylate.*	Small crystalline scales; colourless or nearly colourless.	Neutral or faintly
8. *Sulphocarbolate.*	Rhombic prisms; colourless and transparent.	Neutral.
9. *Tartarated Soda.*	Prisms, or halves of prisms, of right rhombic order; generally 8-sided. Large. Transparent and colourless.	Neutral.

PERTIES OF SALTS OF SODIUM.

Taste.	Solubility.	Changes.
.	Water (1 in 22). Boiling Water (1 in 2). Glycerine (1 in 1). Insoluble in rectified spirit.	Slightly efflorescent. Heat causes aqueous fusion, and the liquid cools to a transparent glass bead.
, alkaline, and tic.	Water (1 in 2). Dilute acids, with effervescence. Insoluble in rectified spirit.	Effloresces and crumbles. Aqueous fusion with heat, and then dries up, losing 63 per cent. of weight.
lly salt or ie.	Water (1 in 2¾). Slightly in rectified spirit; not in pure alcohol.	Should not deliquesce, but often does a little, from presence of impurities.
g and saline.	Water (1 in 2).	Slightly deliquescent. Deflagrates with heat.
; mild.	Water (1 in 5). Insoluble in rectified spirit.	Efflorescent. Loses 63 per cent. of weight by heat.
nd bitter.	Water (1 in 3), and measures 3½. Insoluble in rectified spirit.	Effloresces. Loses 55·9 per cent. of weight by heat.
ish saline.	Readily in water; slightly but completely in alcohol.	Evolves inflammable gases when ignited, and a white residue remains.
g saline, and ewhat bitter.	Readily soluble in water; less so in spirit.	On ignition gives vapours of carbolic acid.
, and slightly er.	Water (1 in 1½). Insoluble in rectified spirit.	When heated leaves an alkaline residue of carbonate.

PHARMACY.—1. *Officinal Preparations.* The preparations of sodium-compounds not considered elsewhere include:—

a. Liquor Sodæ Effervescens.

Bicarbonate of sodium, gr. 30
Water, O 1.
} Dissolve, filter, and pass in pure washed CO_2 gas, with a pressure of about four atmospheres.

b. Liquor Sodii Ethylatis.

Metallic sodium, gr. 22
Ethylic alcohol, fl ℥ 1.
} Dissolve in a flask kept cool in a stream of cold water.

The solution should be recently prepared.

A colourless liquid, of syrupy consistence, becoming brown by keeping. Sp. gr. 0·867.

c. Trochisci Sodii Bicarbonatis, made in the ordinary way with gum acacia, mucilage, and sugar = 5 grains in each lozenge.

d. Glycerinum Boracis.—Colourless.

Powdered borax, 1
Glycerine, 4
Distilled water, 2.
} Rub together in a mortar until dissolved; or heat gently.

e. Mel Boracis—Borax Honey.

Finely-powdered borax, 2
Glycerine, 1
Clarified honey, 16.
} Mix.

2. The *other preparations* in making which the salts of sodium are used, are as follows:—

a. Bicarbonate.—Phosphate of Iron; and Syrup of Phosphate of Iron.

b. Chloride.—Hydrochloric Acid; Subchloride and Perchloride of Mercury.

c. Phosphate.—Phosphate of Iron; and Syrup of Phosphate of Iron.

d. Valerianate.—Valerianate of Zinc.

3. *Incompatibles.*—These include all drugs which the student's knowledge of chemistry teaches him are chemically incompatible with sodium, or with the acids contained in the several salts.

Action of Sodium Group.

The action of the members of this group are in many respects similar to those of the preparations of potassium, and they may be considered according to the same plan.

1. *External and local applications.*—Caustic soda is a **caustic** or **escharotic,** but less powerful than caustic potash. The solution of ethylate of sodium is also used as a mild **caustic.** Solution of soda is slightly **caustic, detergent, antacid,** or **cutaneous sedative,** but is seldom used. The carbonate has similar actions. The bicarbonate in solution is a useful **antacid,** employed as an application in connection with the skin or certain mucous surfaces, and a saturated solution has been found efficacious in the treatment of burns and scalds. Borax as a lotion is a **cutaneous sedative** and **detergent;** this salt is also much employed as an application to the mouth and throat, its officinal preparations being intended for this purpose, being supposed to have a special effect upon the mucous membrane; it is likewise used as a vaginal injection. Borax is somewhat **antiseptic** and **disinfectant.** Chloride of sodium is a **stimulant** to the skin and **rubefacient,** when used as a bath.

2. *Internal action.*—The effects of sodium upon the system differ from those of potassium, in that it is much less easily absorbed, and therefore has a more marked action upon the alimentary canal; while it has a far less depressing effect upon the

muscular and nervous systems. Urate of sodium is also much less soluble than urate of potassium.

a. Solution of soda, the carbonate, and the bicarbonate act upon the alimentary canal as **direct antacids, peptogens,** and **gastric sedatives.** After absorption they become **remote antacids** or **alkalisers, alteratives,** and **expectorants.** Of this group only the bicarbonate is much given, and this salt is very extensively employed for its effects on the stomach, being less irritating and better borne than the bicarbonate of potassium; it is also believed to lessen the amount of sugar excreted in cases of diabetes.

b. Chloride of sodium is of great value as a food, and should be habitually taken as a condiment. In the stomach it may be used as an **antidote** in cases of poisoning by nitrate of silver; and is a serviceable **emetic** in full doses. It is also employed as a remedy for hæmoptysis. Common salt administered by enema may act as a **purgative,** and is a useful **vermicide,** destroying thread-worms.

c. There is a group of sodium-salts which may be mentioned together, as they are practically employed mainly as **saline aperients,** namely, phosphate, sulphate, citro-tartrate, and tartarated soda (which also contains potassium). In small doses they are **diuretic,** and may affect the acidity of the urine. Phosphate and sulphate are also **hepatic stimulants.**

d. Nitrate of sodium is a **diuretic,** but is seldom used as a medicine.

e. Borax is a mild **remote antacid** and **diuretic;** and in full doses is regarded as an **emmenagogue** and **ecbolic.**

f. Salicylate of sodium is an **antipyretic,** and has a special action in rheumatic fever. (See Salicylic Acid).

g. Sulphocarbolate of sodium is **antiseptic** and **antizymotic.**

h. Valerianate of sodium is a **nervine tonic,** but is seldom used.

Doses—As given in the B.P., the doses of the compounds and preparations of sodium now under consideration are as follows:—

Bicarbonate, gr. 10 to 60.
Carbonate, gr. 5 to 30.
Dried Carbonate, gr. 3 to 10.
Citro-tartrate, gr. 60 to 120.
Phosphate, ʒ ¼ to 1.
Salicylate, gr. 10 to 30.
Sulphate, ʒ ¼ to 1.
Sulphocarbolate, gr. 10 to 15.
Valerianate, gr. 1 to 5.
Borax, gr. 5 to 40.
Tartarated Soda, ʒ ¼ to ½.
Trochisci Sodii Bicarbonatis, 1 to 6.

XII. LITHIUM.

The preparations of lithium in the B.P. are only three in number, and the chief facts relating to them may be given in a tabular form.

NAME.	PREPARATION.	PROPERTIES AND TESTS.
1. *Lithii Carbonas*—*Carbonate of Lithium* = Li_2CO_3.	No method of preparation is given in the B.P., but this salt is made by the action of **carbonate of ammonium** on **sulphate** or **chloride of lithium.**	*a.* A white powder, or minute crystalline grains. *b.* Alkaline reaction. *c.* Soluble in water (1 in 150). Insoluble in alcohol. *d.* 10 grains, neutralized with sulphuric acid, and heated, leave 14·86 grains = sulphate.
2. *Lithii Citras* — *Citrate of Lithium* = $Li_3C_6H_5O_7$.	*a.* Add in successive portions **Carbonate of lithium,** gr. 50 to { **Citric acid,** gr. 90 / **Water,** fl ʒ 1. *b.* Dissolve by heat until effervescence ceases. *c.* Evaporate to sp. gr. of about 1·230. *d.* Set aside to crystallise, and dry and preserve in stoppered bottles.	*a.* White crystalline salts. *b.* Soluble in water (1 in 2½), without leaving any residue. *c.* 20 grains burned at a low red heat, with free access of air, leave 7·8 grains of white residue.
3. *Liquor Lithiæ Effervescens* — Lithia Water.	Prepared by a similar process to Potash and Soda Water. Contains gr. 10 of carbonate of lithium in O 1.	*a.* A clear colourless liquid. *b.* Effervesces strongly. *c.* Acidulous taste.

ACTION.—The compounds of lithium are **antacid** and **diuretic,** but are chiefly used as solvents of uric acid, the urate of lithium being the most soluble of all. They are mainly employed in gout, both internally and as external applications.

Doses—Of Carbonate, gr. 3 to 6; Citrate, gr. 5 to 10; Effervescing solution, fl ʒ 5 to 10.

XIII. ALUMINIUM.

Only certain forms of *Alum* are officinal, and they may be considered together.

1. **Alumen—Alum** = $Al_2 3SO_4$, K_2SO_4, $24H_2O$; or $Al_2 3SO_4$, $(NH_4)_2SO_4$, $24H_2O$. Sulphate of aluminium and potassium (potassium alum or potash alum), or of aluminium and ammonium (ammonium or ammonia alum), crystallised from solution in water.

Source and Preparation.—The preparation of alum is not given in the B.P., but it may be stated that it is made from *alum-schist*, by roasting, exposing to the air, lixiviating, evaporating the solution, adding a concentrated solution of sulphate of ammonium or potassium, and crystallising.

Characters and Properties.—*a*. Alum is in crystalline masses, exhibiting the faces of the regular octahedron; colourless and transparent.

b. It has an acid, sweetish and astringent taste; and a strongly acid reaction.

c. It is soluble in water (1 in 10 or 11); boiling water (10 in 8); glycerine (1 in 4). Insoluble in rectified or proof spirit.

d. Alum forms insoluble compounds with albumin, fibrin, casein, and gelatin.

2. **Alumen Exsiccatum—Dried** or **Burnt Alum.** Potash alum deprived of its water of crystallisation.

Preparation.—Heat **potassium alum** in a porcelain dish or other suitable vessel; raise the heat not above 400°, and continue till aqueous vapour ceases to be disengaged, and the salt has lost between 45 and 46 per cent. of its weight. Reduce the residue to powder, and preserve in a well-stoppered bottle.

CHARACTERS.—Dried alum is a white spongy mass or powder; slowly but completely soluble in water.

PHARMACY.—*Officinal Preparation :—*

Glycerinum Aluminis—Glycerine of Alum.

Alum, in powder, 1
Glycerine, 5. } Dissolve with gentle heat and stirring. Set aside; and pour off the clear fluid from any deposited matter.

ACTION.—Alum is a powerful **astringent,** both external and internal. It is **purgative** and **emetic** in large doses. Dried alum is slightly **escharotic,** and is only used externally. Alum is also given as a supposed specific remedy for hooping-cough.

Dose—Of Alum, 10 to 20 grains.

XIV. CALCIUM.

General Summary.—The officinal compounds of calcium may be conveniently arranged thus:—

1. **Forms of Lime.**
   - *a. Calx—Lime* = CaO. Impure.
   - *b. Calcii Hydras — Slaked Lime* = $Ca(HO)_2$. Impure.

2. **Solutions of Lime.**
   - *a. Liquor Calcis — Lime-water.*—A solution of slaked lime in water = about gr. ½ in fl ʒ j.
   - *b. Liquor Calcis Saccharatus.* — A saccharine solution of lime = 7·11 grains in fl ʒ j.

3. **Forms of Carbonate of Calcium** = $CaCO_3$.
   - *a. Creta — Chalk.*
   - *b. Creta Præparata—Prepared Chalk.*
   - *c. Calcis Carbonas Præcipitata — Precipitated Carbonate of Calcium.*
   - *d. Marmor Album — White Marble.*

4. **Various Salts of Calcium.**
   - *a. Calx Chlorinata* (*see* Chlorine).
   - *b. Calx Sulphurata* (*see* Sulphur).
   - *c. Calcii Chloridum — Chloride of Calcium* = $CaCl_2,2H_2O$.
   - *d. Calcii Hypophosphis* = $Ca(PH_2O_2)_2$ (*see* Phosphorus).
   - *e. Calcii Phosphas — Phosphate of Calcium* = $Ca_3(PO_4)_2$.
   - *f. Calcii Sulphas — Sulphate of Calcium.* Nearly anhydrous $CaSO_4$.

5. Special Officinal Preparations.

a. Mistura Cretæ—Chalk Mixture.
b. Pulvis Cretæ Aromaticus.
c. Pulvis Cretæ Aromaticus cum Opio.
d. Hydrargyrum cum Cretâ—Grey Powder (*see* MERCURY).
e. Linimentum Calcis.
f. Liquor Calcis Chlorinatæ (*see* CHLORINE).
g. Liquor Calcii Chloridi.

The preparations of calcium in the foregoing list, which are not discussed elsewhere, may be considered under two main groups.

A. LIME AND ITS SOLUTIONS.

SOURCE AND PREPARATION:—

1. *Lime.*—Obtained by calcining **chalk** or **limestone,** so as to expel the carbonic acid.

$$CaCO_3 = CaO + CO_2.$$

2. *Slaked lime.*—Act upon **lime,** lb 2, by **water,** O1, in a metal pot. When vapour ceases to be disengaged, cover the pot with a lid and set it aside to cool; then sift the slaked lime by gentle agitation, and preserve the fine powder in well-stoppered bottles. Should be recently prepared.

3. *Liquor Calcis.*—Put washed **slaked lime,** ℥ 2, into a stoppered bottle containing **distilled water,** C1, and shake well for two or three minutes. After 12 hours the clear solution may be drawn off with a siphon as required for use, or transferred to a well-stoppered green-glass bottle.

4. *Liquor Calcis Saccharatus.*

Digest for a few hours in a corked bottle, shaking occasionally

Slaked lime, 1
Refined sugar, 2
Distilled water, 20.

Separate the clear solution with a siphon, avoiding unnecessary exposure to air, and keep it in a well-stoppered bottle.

CHARACTERS AND PROPERTIES :—

1. *Lime.*—*a.* This substance occurs in compact masses, of a whitish colour.

b. They readily absorb water, swell, and fall into powder, with development of much heat.

c. Solubility in fl ℥ 20 of water { at 32° = 13·25 grains. at 60° = 11·2 ,, at 212° = 6·7 ,, }

d. The solution is alkaline.

2. *Slaked Lime* is a white bulky powder.

3. *Solutions of Lime.*—*a.* These are colourless, but the *saccharated solution* is liable to become brownish by keeping.

b. They have an alkaline reaction.

c. Sp. gr. of saccharated solution = 1·052.

d. They readily absorb CO_2 from the air, and become covered with a film of carbonate of lime.

QUANTITATIVE TEST.—**Power of Neutralization.**

	Grain-measures of Vol. sol. of oxalic acid.
1. Liquor Calcis, fl ℥ 10	= 180.
2. Liquor Calcis Saccharatus, fl ℥ 1 or 460·2 grs.	= 254.

PHARMACY.—1. *Officinal Preparation :—*

Linimentum Calcis. A thickish cream. { Solution of lime, 1 / Olive oil, 1. } Mix with agitation.

2. *Slaked lime* is used in the preparation of Chlorate of Potassium.

Solution of lime is an ingredient in Lotio Hydrargyri Fluva and Lotio Hydrargyri Nigra; and is used in making Oxide of Silver.

3. *Incompatibles.*—Mineral and vegetable acids; alkaline and metallic salts; tartarated antimony.

B. Salts of Calcium.

Source and Preparation:—

1. *Chalk.*—Native friable carbonate of calcium.

2. *Prepared Chalk.*—Chalk freed from most of its impurities by elutriation, and afterwards dried in small masses, which are usually of a conical form.

3. *Precipitated Carbonate.*

a. Mix solutions in *boiling* distilled water of { **Chloride of calcium,** ℥ 5 ; **Carbonate of sodium,** ℥ 13 } each in 2 pints.

b. Collect the precipitate on a calico filter; wash away the NaCl with boiling water; and dry at 212°.

4. *White Marble.*—This is a hard white crystalline native carbonate of calcium, in masses, used in producing CO_2 gas.

5. *Chloride.—a.* Neutralize **hydrochloric acid** with **carbonate of calcium,** adding a little **solution of chlorinated lime** and **slaked lime,** to peroxidise and precipitate any iron present.

b. Filter; evaporate the liquid until it becomes solid; and dry at about 400°.

6. *Phosphate.*—This salt is made as follows:—

a. Dissolve **bone-ash,** ℥ 4 in { **Hydrochloric acid,** fl ℥ 6 ; **Water,** O 1.

$Ca_3 2PO_4 + 4HCl = CaH_4 2PO_4 + 2CaCl_2$.

b. Boil for a few minutes; filter; add **water** O 1, and afterwards **solution of ammonia,** until the mixture is alkaline.

$CaH_4 2PO_4 + 2CaCl_2 + 4NH_4HO = Ca_3 2PO_4 + 4NH_4Cl + 4H_2O$.

c. Wash the precipitate on a calico filter with boiling water, to remove NH_4Cl; and dry not above 212°.

7. *Sulphate.*—Native sulphate of calcium ($CaSO_4$, $2H_2O$), rendered nearly anhydrous by heat.

CHARACTERS AND PROPERTIES :—

1. *Carbonates.*—The several forms may be considered together.

a. Appearance
- (i) *Chalk.*—In irregular whitish masses.
- (ii) *Prepared Chalk.*—A white amorphous substance, usually in cone-shaped masses.
- (iii) *Precipitated Carbonate.*—A white crystalline powder.

b. All forms are insoluble in water; soluble in dilute hydrochloric acid, with effervescence.

2. *Chloride.*—*a.* Chloride of calcium is in white agglutinated masses.

b. It is very deliquescent; rapidly absorbs water; and is a powerful desiccating agent.

c. It is entirely soluble in water (1 in 2), and can be crystallised in prisms; also in alcohol.

d. It has a bitter, acrid, and saline taste.

3. *Phosphate.*—*a.* This salt is a light, white, amorphous powder.

b. It is insoluble in water; soluble in diluted nitric acid, without effervescence.

IMPURITIES.—The chief of these are :—

1. *Carbonates*—Phosphate and chloride.

2. *Chloride*—Hypochlorite or chlorine, evolved on addition of HCl; carbonate.

3. *Phosphate*—Carbonate; chloride.

PHARMACY.—1. *Officinal Preparations :—*

a. Mistura Cretæ—Chalk Mixture.

Prepared chalk, 1 Gum acacia, 1 Syrup, 2 Cinnamon Water, 30	Triturate the chalk and gum acacia with the cinnamon water, add the syrup, and mix.

b. Pulvis Cretæ Aromaticus = dark fawn. Chalk =1 in 4 nearly.

Prepared chalk, 11 Cinnamon, 4 Nutmeg, 3 Saffron, 3 Cloves, 1½ Cardamom seeds, 1 Refined sugar, 25.	Powder the several ingredients; mix thoroughly; pass through a fine sieve; and rub lightly in a mortar.

c. Pulvis Cretæ Aromaticus cum Opio = dark fawn.

Aromatic powder of chalk, 39 Opium in powder, 1.	Prepared as above.

d. Liquor Calcii Chloridum. Sp. gr. 1·145.

Chloride of calcium, 1 Distilled water, 5.	Dissolve, and filter if necessary.

2. The salts of calcium now under consideration are employed in pharmacy as follows:—

a. Marble is used in making CO_2 gas.

b. Precipitated carbonate is contained in Trochisci Bismuthi.

c. Prepared chalk is contained in Hydrargyrum cum Cretâ.

d. Phosphate is contained in Pulvis Antimonialis.

e. Sulphate is used in making Calx Sulphurata.

f. Chloride is frequently employed as a desiccating agent.

Action of Calcium Group.

The action of the preparations of calcium which are used for medicinal purposes, and which are not discussed elsewhere, may be readily summed up in the following way:—

1. *External and local applications.*—Lime is a **caustic,** and was formerly used in combination with caustic potash. Lime-water and chalk are

direct antacids, sedatives, and **astringents,** and may be employed in connection with the skin or a mucous surface. The linimentum calcis is a well known application for burns and scalds. Prepared chalk is much employed as a tooth powder.

2. *Internal actions.*—Most of the preparations of calcium have important actions in connection with the alimentary canal. The solutions of lime and the carbonates are efficient **antacids** and **astringents.** Lime-water is a valuable **gastric sedative** in certain conditions; it is also much employed for preventing the curdling of milk. Any of these preparations may be used as an **antidote** in cases of poisoning by oxalic acid. Lime-water is a **vermicide,** administered in the form of enema for thread-worms. Chloride of calcium has been recommended in certain forms of vomiting, accompanied with weak digestion and chronic diarrhœa.

The preparations of calcium are only absorbed in very small proportion, and yet they produce important effects upon the system. Practically they may be regarded as **nutrients** to certain tissues, especially the bones, and as **alteratives,** and they are all extensively employed for these purposes in rickets and other forms of disease.

Doses—Liquor Calcis, fl ʒ 1 to 4.
Liquor Calcis Saccharatus, ♏ 15 to 60.
Prepared Chalk, gr. 10 to 60.
Precipitated Chalk, gr. 10 to 60.
Chloride, gr. 3 to 10.
Phosphate, gr. 10 to 20.
Liquor Calcii Chloridi, ♏ 15 to 50.
Mistura Cretæ, fl ʒ 1 to 2.
Pulvis Cretæ Aromaticus, gr. 10 to 60.
Pulvis Cretæ Aromaticus cum Opio, gr. 10 to 40.

XV. CERIUM.

There is only one officinal compound of this metal, namely:—

Cerii Oxalas—Oxalate of Cerium
$= CeC_2O_4, 3H_2O.$

SOURCE AND PREPARATION.—A salt which may be obtained as a precipitate by adding solution of **oxalate of ammonium** to a soluble salt of cerium. It usually contains some oxalate of lanthanum and oxalate of didymium.

CHARACTERS AND PROPERTIES:—

1. Oxalate of cerium is a white granular powder.
2. It is insoluble in water.
3. It is decomposed at a dull-red heat to a reddish-brown powder $= CeO$ and CeO_2. 10 grains incinerated lose 5·2 grains in weight.

ACTION.—Oxalate of cerium is a **gastric sedative.**

Dose—gr. 1 to 2.

XVI. MAGNESIUM.

General Summary.—The preparations of magnesium in the B.P. may be thus arranged:—

1. **Forms of Magnesia** = MgO.
   - *a. Magnesia Levis—Light Magnesia.*
   - *b. Magnesia Ponderosa — Heavy Magnesia.*

2. **Forms of Carbonate** = $(MgCO_3)_3, Mg(HO)_2, 4H_2O$.
   - *a. Magnesii Carbonas Levis—Light Carbonate of Magnesium*
   - *b. Magnesii Carbonas Ponderosa—Heavy Carbonate of Magnesium.*

3. **Magnesii Sulphas**—*Sulphate of Magnesium*—*Epsom Salt* = $MgSO_4$, $7H_2O$.

4. **Solutions of Salts of Magnesium.**
   - *Enema Magnesii Sulphatis.*
   - *a. Liquor Magnesii Carbonatis—Fluid Magnesia.*—A solution with CO_2, containing nearly gr. 10 of carbonate of magnesium in fl ℥ j, or about two per cent.
   - *b. Liquor Magnesii Citratis—Limonade Purgative.*—A solution of citrate of magnesium.

For practical purposes the compounds of magnesium may be considered according to the following plan:—

A. Sulphate of Magnesium.

Source and Preparation.—The preparation of this salt is not mentioned in the B.P., but it is made by acting upon magnesian limestone by

sulphuric acid; filtering from the insoluble calcic sulphate; evaporating and crystallising.

CHARACTERS AND PROPERTIES:—

a. Sulphate of magnesium occurs in minute rhombic prisms; colourless and transparent.

b. It is readily soluble in water (10 in 13); insoluble in alcohol.

c. It has a bitter and unpleasant taste.

d. It slowly effloresces when exposed to the air.

QUANTITATIVE TEST.—The precipitate given by carbonate of sodium, when obtained from a boiling solution of 100 grains of the salt, should, when well washed, dried, and heated to redness, weigh 16·26 grains.

PHARMACY.— 1. *Officinal Preparation*:—

Enema Magnesii Sulphatis.

Sulphate of Magnesium, ℥ i
Olive Oil, fl ℥ j
Mucilage of Starch, fl ℥ xv.

} Dissolve the sulphate in the mucilage, add the oil, and mix.

2. *Sulphate of magnesium* is contained in Mistura Sennæ Composita.

3. *Incompatibles.*—Lime-water; alkaline carbonates; acetate of lead; nitrate of silver.

B. CARBONATES OF MAGNESIUM AND FORMS OF MAGNESIA.

SOURCE AND PREPARATION.—1. *Carbonates.—a*. The ingredients used in preparing the two carbonates are the same in both cases, namely:—

Sulphate of magnesium, ℥ 10
Carbonate of sodium, ℥ 12.

There are important differences, however, in the earlier part of the process, and they may be thus contrasted:—

Heavy Carbonate.	Light Carbonate.
(i). Mix two *boiling* and *strong* solutions, each salt having been previously dissolved in **boiling water,** Oj.	(i). Mix two *cold* and *much diluted* solutions, each salt having been previously dissolved in **cold distilled water,** C½.
(ii). Evaporate to perfect dryness by means of a sand-bath. Digest the residue with **boiling water** (O2) for half an hour.	(ii). Boil the mixture in a porcelain dish for 15 minutes.

b. After this, in each case collect the precipitate on a calico filter; wash repeatedly from sulphate of sodium; and dry under 212°.

2. *Forms of Magnesia.*—The two forms of magnesia are prepared from their respective **carbonates,** by exposing them to a low red heat in a Cornish or Hessian crucible closed loosely by a lid, until a small quantity, *taken from the centre* of the crucible, cooled, moistened with water, and dropped into warm diluted sulphuric acid, causes no effervescence.

Characters and Properties.—The characters of this group may be summarised thus:—

a. They are all apparently white amorphous powders, but the *carbonate* is minutely granular, and the *light carbonate* contains numerous slender prisms intermixed.

b. The *light* forms are much the more bulky, in the case of the *magnesias* the volumes corresponding to similar weights being in the ratio of 3½ to 1.

c. They are insoluble in water; soluble in dilute acids, the *carbonates* with effervescence.

Impurities.—Lime; sulphate.

Quantitative Test.—50 grains of heavy carbonate calcined at a red heat are reduced to 22.

Pharmacy.—1. Either *heavy* or *light magnesia* may be used as an ingredient in Pulvis Rhei Compositus.

2. *Light carbonate* is used in making Vapor Olei Pini Sylvestris; *heavy carbonate* is an ingredient in Trochisci Bismuthi.

C. Solutions of Salts of Magnesium.

Source and Preparation:—

1. *Liquor Magnesii Carbonatis.*

a. Add { **Carbonate of sodium,** ℥ 2½ / **Water,** O ½ } to **Sulphate of magnesium,** ℥ 2 / **Water,** O ½ } heated to the boiling point.

b. Boil them together until CO_2 ceases to be evolved.

c. Collect the precipitated carbonate on a calico filter, and wash it with distilled water from sulphate of sodium.

d. Mix with **distilled water,** O 1, and saturate with pure washed CO_2 gas, under the pressure of about 3 atmospheres.

e. Filter after 24 hours, and again pass in CO_2 gas. Keep in a bottle securely closed.

2. *Liquor Magnesii Citratis.*

a. Dissolve **carbonate of magnesium,** gr. 100, in { **Citric acid,** gr. 200 / **Water,** fl ℥ 2.

b. Filter into a strong half-pint bottle.

c. Add { **Syrup of lemons,** fl ℥ ½ / **Water,** nearly to fill the bottle.

d. Put in crystals of **bicarbonate of potassium,** gr. 40; secure the cork with string or wire; and shake until the bicarbonate is dissolved.

Characters and Properties.—Both these solutions are clear liquids. The B.P., alluding to the Liquor Magnesii Carbonatis, says that it effervesces slightly, or not at all, when the containing vessel is first opened. It is free from any bitter taste. A

fluid-ounce evaporated to dryness yields a white solid residue, which after being calcined weighs about 6 grains = magnesia.

Action of Magnesium Group.

The preparations of magnesium are only used internally. In the alimentary canal magnesia and its carbonate are **antidotes** in cases of poisoning by acids, arsenic, and certain alkaloids; and they are also **antacids** of great value. All the compounds are more or less **aperient,** the sulphate being a most efficient **saline aperient.** After absorption they act to some degree as **remote antacids;** and the sulphate given well-diluted and in small doses, is **diuretic.**

Doses—Of either form of Magnesia or Carbonate, gr. 10 to 60.
Sulphate, gr. 60 to ʒ ½.
Liquor Magnesii Carbonatis, fl ʒ 1 to 2.
Liquor Magnesii Citratis, fl ʒ 5 to 10.

XVII. ANTIMONIUM—ANTIMONY.

General Summary.—The officinal compounds and preparations containing antimony include:—

1. **Antimonium Nigrum Purificatum—Purified Black Antimony—Sulphide of Antimony**=Sb_2S_3.

2. **Antimonium Sulphuratum—Sulphurated Antimony.**—A mixture containing sulphide and oxide of antimony, Sb_2S_3 and Sb_2O_3.

3. **Antimonii Oxidum—Oxide of Antimony** =Sb_2O_3.

4. **Antimonium Tartaratum—Tartarated Antimony—Potassio-tartrate of Antimony—Tartar Emetic.**—An oxytartrate of antimony and potassium=$(KSbOC_4H_4O_6)_2,H_2O$.

5. **Liquor Antimonii Chloridi.**—"Butter of Antimony."—A solution of chloride of antimony ($SbCl_3$) in hydrochloric acid.

6. **Special Officinal Preparations.**
   - *a. Pulvis Antimonialis—Antimonial powder.*—A modification of James's powder, containing oxide of antimony.
   - *b. Vinum Antimoniale—Antimonial wine.*—A solution of tartarated antimony in sherry wine=gr. 2 in fl ʒ 1.
   - *c. Unguentum Antimonii Tartarati—Ointment of Tartarated Antimony.*

The compounds of antimony may be further considered in the order in which they are obtained.

A. Purified Black Antimony.

Source and Preparation.—Fuse the **native sulphide,** to purify from silicious matter; reduce it to fine powder; and if, on testing, any soluble salt of arsenium is present, purify by the following process:—

a. Macerate for 5 days, stirring frequently, { Native Sulphide, in fine powder, lb i
Solution of Ammonia, fl ʒ 8.

b. Allow the powder to subside, pour off the supernatant liquid, and thoroughly wash the residue with distilled water. Dry the powder by the aid of heat.

Characters and Properties.—*a.* Black antimony is a greyish-black, crystalline powder.

b. It is insoluble in water; dissolves almost entirely in boiling HCl, giving off H_2S; and the solution gives a white precipitate when poured into water.

B. Sulphurated Antimony.

Source and Preparation:—

a. Boil for two hours, with frequent stirring, adding water occasionally, { **Purified black antimony,** ʒ 10
Solution of soda, O 4½
Sublimed sulphur, ʒ 10.

(A double sulphide, and a double oxide are formed, thus:—

$$2Sb_2S_3+6NaHO=2Na_3SbS_3+Sb_2O_3+3H_2O.$$
$$Sb_2O_3+6NaHO=2Na_3SbO_3+3H_2O).$$

b. While still hot, add **boiling distilled water,** O 9.

c. Strain through calico, and *before it cools* add by degrees **diluted sulphuric acid** to slight excess. (Sulphate of sodium is formed, and sulphurated antimony is precipitated).

d. Collect on a calico-filter; wash with water from sulphate of sodium; dry under 212°.

CHARACTERS AND PROPERTIES :—

a. Sulphurated antimony is an orange-red powder.

b. It is odourless; has a slight taste.

c. It is insoluble in water or spirit; readily soluble in caustic soda; also in HCl, evolving H_2S, a little sulphur being deposited.

d. It becomes partially decomposed on exposure to light and air, with separation of sulphur.

QUANTITATIVE TEST.—60 grains moistened and warmed with successive portions of nitric acid, until red fumes cease to be evolved, and then dried and heated to redness, give a white residue weighing about 40 grains.

PHARMACY.—Sulphurated antimony is an ingredient in Pilula Hydrargyri Subchloridi Composita (Plummer's Pill).

C. SOLUTION OF CHLORIDE OF ANTIMONY.

SOURCE AND PREPARATION.—*a.* Dissolve by the aid of gradual heat, constantly stirring,

Purified black antimony, lb 1 } Boil for 15
Hydrochloric acid, O 4. } minutes.

$$Sb_2S_3 + 6HCl = 2SbCl_3 + 3H_2S.$$

(The H_2S gas escapes through a flue).

b. Filter through calico; boil down to 2 pints; and preserve in a stoppered bottle.

CHARACTERS AND PROPERTIES:—

a. This solution is a yellowish-red heavy liquid; sp. gr. about 1·47.

b. It gives a white precipitate of oxychloride when dropped into water, which becomes orange-red when treated with H_2S.

c. It is destructive to organic tissues.

QUANTITATIVE TEST.—1 fluid drachm mixed with a solution of tartaric acid (ʒ ½ in fl ʒ 4 of water) forms a clear solution, which, if treated with H_2S, gives an orange precipitate, weighing, when washed and dried at 212°, about 22 grains.

D. OXIDE OF ANTIMONY.

SOURCE AND PREPARATION:—

a. Mix thoroughly { **Solution of chloride of antimony,** fl ʒ 16 **Distilled water,** C 2.

b. Repeat a series of processes of allowing the precipitate to subside; removing the liquid by a siphon; adding C1 of water; agitating; and again allowing to subside. *Oxychloride of Antimony,* $2SbCl_3,5Sb_2O_3$, is thus formed.

c. Add, and leave in contact for half an hour, stirring frequently { **Carbonate of sodium,** ʒ 6 **Distilled water,** O 2.

$$2SbCl_3,5Sb_2O_3+3Na_2CO_3=6Sb_2O_3+6NaCl+3CO_2.$$

d. Collect the deposit of oxide of antimony on a calico filter; wash away the chloride of sodium with boiling distilled water; and dry under 212°.

CHARACTERS AND PROPERTIES:—

a. Oxide of antimony is a greyish-white powder.

b. It is insoluble in water; readily soluble in hydrochloric acid.

c. The solution in HCl, when dropped into water, gives a white precipitate—*Oxychloride of antimony*, at once changed to orange by H_2S.

d. The oxide is fusible at a low red heat.

PHARMACY.—*Officinal Preparation:—*

Pulvis Antimonialis—Antimonial Powder.

Mix { Oxide of Antimony, 1 / Phosphate of Calcium, 2.

E. TARTARATED ANTIMONY—TARTAR EMETIC.

a. Make a paste with water of { **Oxide of antimony,** ʒ 5 / **Acid tartrate of potassium** in fine powder, ʒ 6 } ; and set aside for 24 hours.

b. Add **distilled water,** O 2, and boil for a quarter of an hour, stirring frequently.

c. Filter; set aside to crystallise; evaporate the mother liquor to one-third for further crystals; and dry the crystals on filtering paper at the temperature of the air.

$$Sb_2O_3 + 2KHC_4H_4O_6 = 2KSbC_4H_4O_7 + H_2O.$$

CHARACTERS AND PROPERTIES:—

a. Tartar emetic is a crystalline salt = rhombic octahedra, exhibiting triangular facets.

b. The crystals are colourless and transparent.

c. Tartar emetic has a slight metallic taste.

d. It is efflorescent, and becomes opaque on exposure.

e. It is soluble in cold water (1 in 15), boiling water (1 in 2), partially in proof spirit. It dissolves entirely when boiled with an excess of acid tartrate of potassium.

f. The aqueous solution has an acid reaction, and decomposes readily.

g. Tartarated antimony decrepitates and blackens by the application of heat.

QUANTITATIVE TEST.—29 grains dissolve slowly but without residue in fl ℥ i of distilled water at 60°, and the solution gives with H_2S an orange precipitate, which, when washed and dried at 212°, weighs 151 grains.

PHARMACY.—1. *Officinal Preparations:—*

a. Unguentum Antimonii Tartarati.

Mix thoroughly { Tartarated antimony, in fine powder, 1 / Simple ointment, 4.

b. Vinum Antimoniale.

Dissolve, and filter if necessary { Tartarated antimony, gr. 40 / Sherry wine, O 1.

2. *Incompatibles.*—The chief incompatibles of tartarated antimony are alkalies; lead salts; gallic and tannic acids; and vegetable astringents generally.

ACTION OF ANTIMONIUM GROUP.

1. Externally the solution of chloride of antimony is a powerful **caustic.** Tartarated antimony, in the form of ointment, applied to the skin, is a characteristic **pustulant.**

2. Internally the oxide of antimony is sometimes used in the form of antimonial powder, as a **diaphoretic** in febrile affections, or as an **alterative.** Sulphurated antimony is merely given in the form of compound calomel pill, as an **altera-**

tive. Tartarated antimony is the preparation commonly employed, and this drug is used in different doses as a **diaphoretic, cardiac** and **vascular depressant, sedative expectorant,** or **depressing emetic.** In large doses all the preparations of antimony are powerful irritant poisons.

Doses—Of Oxide, gr. 1 to 4; Sulphurated Antimony, gr. 1 to 5; Tartarated Antimony, as a diaphoretic, gr. $\frac{1}{16}$ to $\frac{1}{6}$, as an emetic, gr. 1 to 2; Antimonial wine, ℥5 to fl 3 j.

XVIII. ARGENTUM—SILVER.

General Summary.—The following preparations of silver are now recognised in the B.P.

1. **Argentum Purificatum—Refined Silver.** Pure metallic silver. Introduced for making *Argenti Nitras*.

2. **Argenti Nitras — Nitrate of Silver — Lunar Caustic** = $AgNO_3$.

3. **Argenti et Potassii Nitras—Nitrate of Silver and Potassium—Mitigated Caustic.** A mixture of the fused nitrates of silver and potassium = 1 to 2.

4. **Argenti Oxidum — Oxide of Silver** = Ag_2O.

Each of these compounds will now be considered separately.

1. Argenti Nitras—Nitrate of Silver.

Source and Preparation:—

a. Add { **Nitric acid,** ℥ 2½ / **Distilled water,** ℥ 5 } to **refined silver,** ℥ 3, in a flask, and dissolve with gentle heat.

b. *Decant* the clear liquor; evaporate; and set aside to crystallise. Again evaporate the liquor and crystallise.

c. Drain the crystals in a glass funnel, and dry them by exposure to air, carefully avoiding contact with organic substances.

d. Fuse the crystals in a capsule of platinum or thin porcelain; and pour the melted salt into proper moulds.

e. Preserve in carefully stoppered bottles.

(To form Toughened Nitrate of Silver or "Toughened Caustic," add 5 parts of nitrate of potassium to 95 parts of the nitrate of silver before fusion).

CHARACTERS AND PROPERTIES.—*a.* Nitrate of silver is in colourless tabular right rhombic prisms; or white cylindrical rods.

b. It is soluble in water (gr. 100 in ℥50); also in rectified spirit.

c. It darkens on exposure to light, and stains the neck of the containing bottle.

d. 10 grains with water, fl ʒ ij, and HCl yield a precipitate of chloride of silver, weighing 8·44 grains, when washed with hot distilled water, and thoroughly dried. The filtrate should leave no residue on evaporation.

2. **Argenti et Potassii Nitras — Mitigated Caustic.**

SOURCE AND PREPARATION:—

a. Fuse and mix thoroughly together in a capsule of platinum or thin porcelain

{ **Nitrate of silver,** 1
{ **Nitrate of potassium,** 2.

b. Pour the melted mass into proper moulds.

c. Preserve in bottles carefully stoppered.

CHARACTERS AND PROPERTIES.—*a.* This salt is in cylindrical rods or cones; white or greyish-white.

b. It is freely soluble in water, but only sparingly in rectified spirit.

c. 30 grains dissolved in water, fl ʒ ½, give with HCl a precipitate, which, when washed with hot water and thoroughly dried = 8·44 grains.

3. **Argenti Oxidum—Oxide of Silver.**

SOURCE AND PREPARATION:—

a. Pour { **Nitrate of silver,** ʒ ½ / **Distilled water,** fl ʒ 4 } into **Solution of lime,** O 3½, in a bottle.

b. Shake well, and set aside to allow the deposit to settle.

c. *Draw off* the fluid; collect the deposit on a filter; wash it with distilled water, fl ʒ 6; and dry under 212°. Keep it in a well-stoppered bottle.

CHARACTERS AND PROPERTIES.—*a*. Oxide of silver is an olive-brown or black powder.

b. It is insoluble in water; slightly soluble in ammonia; completely in nitric acid.

c. It decomposes in contact with organic matters.

d. Heated to redness, 116 grains leave 108 of pure silver.

INCOMPATIBLES.—The incompatibles of *nitrate of silver* include alkalies and their carbonates; chlorides; acids (except nitric and acetic); iodide of potassium; solutions of arsenic; and astringent infusions. The *oxide* is liable to explode when prescribed with creosote or chlorides in pill, and before mixing must be diffused through some simple powder.

ACTION OF SILVER GROUP.

Externally or locally applied, nitrate of silver is a **caustic, vesicant, stimulant,** or **astringent,** according to its strength and mode of application. The nitrate of potassium and silver is, as its other name implies, "a mitigated caustic." Internally, both the nitrate and oxide of silver are **astringent** to the alimentary canal, and **nervine tonic.** The nitrate is liable to produce a dark line on the gums, followed by discoloration of the skin.

Dose—Of Nitrate, gr. $\frac{1}{6}$ to $\frac{1}{3}$; of Oxide, gr. $\frac{1}{2}$ to 2 in pill.

XIX. ARSENIUM—ARSENIC.

General Summary.—The B.P. compounds and preparations which contain arsenic may be conveniently arranged and discussed as follows:—

A. **Acidum Arseniosum—Arsenious Acid.** An anhydride (not a true acid). As_2O_3.

B. **Salts containing Arsenic.**

1. *Arsenii Iodidum* = AsI_3.
2. *Ferri Arsenias—Arseniate of Iron*, with some oxide.
3. *Sodii Arsenias — Arseniate of Sodium* = Na_2HAsO_4, $7H_2O$. When freshly crystallised = Na_2HAsO_4, $12H_2O$.

C. **Solutions containing Arsenic.** The first two solutions contain 1 per cent. of *arsenious acid*, or $4\frac{1}{3}$ grains in fl ʒ j; the third contains about 1 per cent. of *arsenious iodide* and *mercuric iodide*; the last, 1 per cent. of *arseniate of sodium*.

1. *Liquor Arsenicalis—Arsenical Solution—Fowler's Solution.* An aqueous solution of arsenious acid and carbonate of potassium, coloured by tincture of lavender.
2. *Liquor Arsenici Hydrochloricus.* A diluted solution of *arsenic trichloride* = $AsCl_3$.
3. *Liquor Arsenii et Hydrargyri Iodidi—Solution of Iodide of Arsenium and Mercury—Donovan's Solution.* An aqueous solution of iodide of arsenium and red iodide of mercury.
4. *Liqour Sodii Arseniatis—Solution of Arseniate of Sodium.*

A. Arsenious Acid—White Arsenic.

Source and Preparation.—Obtained by roasting arsenical ores, and purified by sublimation.

CHARACTERS AND PROPERTIES :—

a. Arsenious acid occurs as a heavy white powder; or in sublimed masses, which usually present a stratified appearance, caused by the existence of separate layers, differing from each other in degrees of opacity. When slowly sublimed in a glass tube, it forms minute brilliant and transparent crystals of octahedral character.

b. It is odourless and tasteless, but leaves a faint sweetish after-impression.

c. Arsenious acid is sparingly soluble in cold water (1 in 100); in boiling water (1 in 20); freely in glycerine; slightly in alcohol.

d. It is entirely volatilized at a temperature not exceeding 400°, without melting. Sprinkled on a red-hot coal, it emits an alliaceous or garlic-like odour.

QUANTITATIVE TEST.—4 grains dissolved in boiling water with about 20 grains of bicarbonate of sodium, discharge the colour of 808 grain-measures of *Vol. solution of iodine.*

B. SALTS CONTAINING ARSENIUM.

SOURCE AND PREPARATION :—

1. *Arsenii Iodidum.*—Obtained by the direct combination of **iodine** and **metallic arsenium,** or by evaporating to dryness an aqueous mixture of **arsenious** and **hydriodic acid.**

2. *Sodii Arsenias—Arseniate of Sodium.*

a. Mix thoroughly in a mortar finely powdered
Arsenious acid, ℥ 10
Nitrate of sodium, ℥ 8½
Dried carbonate of sodium, ℥ 5½.

b. Expose to a full red heat in a covered clay crucible, until all effervescence has ceased, and complete fusion has taken place.

c. Pour out the fine salt on a clean flag-stone, and when solid, but still warm, put into *boiling water* (fl ℥ 35), stirring diligently.

d. Filter the solution through paper; set aside to crystallise; drain and dry the crystals rapidly by exposure on filtering paper; and enclose in stoppered bottles.

The *arsenious acid* is converted by the nitrate of sodium into *arsenic acid*, which expels the CO_2 from the carbonate, and forms *pyro-arseniate of sodium* :—

$$As_2O_3+Na_2CO_3+2NaNO_3=Na_4As_2O_7+CO_2+N_2O_3.$$

Solution in water converts this into the officinal arseniate:—$Na_4As_2O_7+H_2O=2Na_2HAsO_4$.

When freshly crystallised, the salt has the composition Na_2HAsO_4, $12H_2O$; on exposure moisture escapes, the effloresced salt only containing $7H_2O$ of crystallisation.

3. *Ferri Arsenias—Arseniate of Iron.*

a. Mix two solutions and stir thoroughly:

Sulphate of iron, ℥ $20\frac{3}{4}$
Boiling water, O 50

Dried arseniate of sodium, ℥ $15\frac{3}{4}$
Boiling water, O 5.

b. Add **bicarbonate of sodium,** ℥ $4\frac{1}{2}$, dissolved in a little water.

$$2Na_2HAsO_4+2NaC_2H_3O_2+3FeSO_4=$$
$$Fe_32AsO_4+3Na_2SO_4+2HC_2H_3O_2.$$

c. Collect the white precipitate on a calico filter, and wash it completely from sulphate of sodium.

d. Squeeze between folds of strong linen in a screw-press; and dry on porous bricks in a warm air-chamber under 100°.

Characters and Properties.—These may be arranged in a tabular form.

Iodide of Arsenium.	Arseniate of Sodium.	Arseniate of Iron.
a. In small crystals.	*a.* Crystalline prisms.	*a.* An amorphous powder.
b. Orange-coloured.	*b.* Colourless; transparent.	*b.* Of a greenish colour.
c. Readily and almost entirely soluble in water and rectified spirit. The aqueous solution has a neutral reaction.	*c.* Soluble in water, the solution being alkaline.	*c.* Insoluble in water; readily soluble in hydrochloric acid.
d. Almost instantly volatilises with heat.	*d.* Heated to 300° it becomes anhydrous.	*d.* Tasteless.

Impurities.—*Arseniate of iron* is liable to contain a sulphate, indicated by the solution in hydrochloric acid when diluted giving a white precipitate with chloride of barium.

Quantitative Tests:—

1. *Arseniate of Iron.*—100 grains dissolved in an excess of sulphuric acid diluted with water, continue to give a blue precipitate with ferrocyanide of potassium, until at least 225 grain-measures of *Vol. solution of bichromate of potassium* have been added.

2. *Arseniate of sodium.*—An aqueous solution of 12·4 grains of anhydrous arseniate of sodium, acidulated with acetic acid, requires not less than 34 grains of acetate of lead for complete precipitation.

C. Solutions containing Arsenium.

Source and Preparation:—

1. *Liquor Arsenicalis—Fowler's Solution.*

a. Dissolve by the aid of heat { **Arsenious acid in powder,** gr. 87
Carbonate of potassium, gr. 87
Distilled water, fl ʒ 10.

b. When cool add { **Compound tincture of lavender,** fl ʒ 5 **Distilled water** = O 1.

Arsenious acid is more soluble with carbonate of potassium, and this is gradually decomposed, forming arseniate of potassium=

$$K_2CO_3 + As_2O_3 = 2KAsO_2 + CO_2.$$

The *tincture of lavender* is added for colouring and flavouring purposes, so that this preparation may be recognised and distinguished from the other solutions containing arsenic.

2. *Liquor Arsenici Hydrochloricus.*

a. Boil until dissolved { **Arsenious acid,** gr. 87 **Hydrochloric acid,** fl ʒ 2 **Distilled water,** fl ʒ 4.

b. Add **Distilled water** = O 1.

3. *Liquor Arsenii et Hydrargyri Iodidi.*

a. Triturate until nearly dissolved { **Iodide of arsenium,** } of each 45 grains. **Red iodide of mercury,** } **Distilled water,** about fl ʒ 1½.

b. Pass through a filter, and wash the latter with sufficient water to produce fl ʒ 10.

4. *Liquor Sodii Arseniatis.*

Dissolve { **Anhydrous arseniate of sodium,** dried by a heat not over 300°, gr. 9 **Distilled water,** fl ʒ 2.

Characters and Properties.—The characters mentioned in the B.P., may be thus contrasted.

Liquor Arsenicalis.	Liquor Arsenici Hydrochloricus.	Liquor Arsenii et Hydrargyri Iodidi.
Reddish colour.	Colourless.	Clear pale yellow.
Alkaline reaction.	Acid reaction.	
Sp. gr. 1·010.	Sp. gr. 1·010.	Sp. gr. 1·016.
Odour of lavender.		Metallic flavour.

QUANTITATIVE TESTS.—442 grains (fl ℥ i) of Liquor Arsenicalis or Liquor Arsenici Hydrochloricus, boiled for five minutes with 20 grains of bicarbonate of sodium, and then diluted with six fluid ounces of distilled water, to which a little mucilage of starch has been added, does not give with the *Vol. solution of iodine* a permanent blue colour until 87·5 grain-measures have been added.

ACTION OF ARSENIUM GROUP.

1. Locally applied arsenious acid is a powerful **escharotic** under certain conditions.

2. Internally administered all the preparations containing arsenium may be employed as **general tonics** and **nutrients; nervine tonics; alteratives,** especially affecting the skin; and **antiperiodics.** In minute doses they seem to exert a beneficial effect upon the alimentary canal, especially the stomach, promoting appetite and digestion, but in large doses they are **irritant poisons,** causing vomiting and purging. They also act upon the conjunctivæ, and the respiratory mucous membrane, tending to cause irritation of these structures. As a poison, arsenium produces fatty degeneration of organs, as well as marked nervous symptoms. Some of the preparations containing this drug are employed on account of its combination with other important remedies.

Doses—Of Arsenious Acid, gr. $\frac{1}{60}$ to $\frac{1}{12}$; Liquor Arsenicalis or Liquor Arsenici Hydrochloricus, ♏2 to 8; Liquor Arsenii et Hydrargyri Iodidi, ♏10 to 30; Arseniate of Sodium, gr. $\frac{1}{15}$ to $\frac{1}{8}$; Liquor Sodii Arseniatis, ♏5 to 10; Arseniate of Iron, gr. $\frac{1}{15}$ to $\frac{1}{2}$. All preparations containing arsenium should be given directly *after meals*, and the doses very gradually increased.

XX. BISMUTHUM—BISMUTH.

General Summary.—This group includes :—

1. **Metallic Bismuth.**
   - *a. Bismuthum.*—The impure metal.
   - *b. Bismuthum Purificatum.*—Purified Bismuth.

2. **Bismuthi Oxidum—Oxide of Bismuth** = Bi_2O_3.

3. **Salts of Bismuth.**
   - *a. Bismuthi Carbonas—Carbonate of Bismuth* = $(Bi_2O_2CO_3)_2,H_2O$.
   - *b. Bismuthi Citras—Citrate of Bismuth* = $BiC_6H_5O_7$.
   - *c. Bismuthi Subnitras—Subnitrate of Bismuth* = $BiONO_3,H_2O$.
     - (i) *Trochisci Bismuthi* = gr. 2 of Subnitrate in each.
   - *d. Bismuthi et Ammonii Citras—Citrate of Bismuth and Ammonium.*

4. **Liquor Bismuthi et Ammonii Citratis—Solution of Citrate of Bismuth and Ammonium.** Equivalent to about gr. 3 of oxide of bismuth in fl 3 1.

A. Metallic Bismuth.

The crude impure metal is introduced into the B.P. to make Purified Bismuth, the preparation and characters of which are described at some length, but it can be of no practical use to the medical student to burden his memory with these details. Several tests are also mentioned, indicating the absence of arsenium, copper, lead, barium, iron, and other impurities.

B. Oxide and Salts of Bismuth.

It will be convenient to take these preparations together, according to the following plan:—

Source and Preparation:—

1. *Carbonate.*
2. *Subnitrate.*

} Both these salts are made from Purified Bismuth, and the earlier part of the process is the same in each case.

a. Add **purified bismuth,** ℥ 2, in small pieces, in successive portions, to { **Nitric acid,** fl ℥ 4 **Distilled water,** fl ℥ 3.

$$(Bi + 4HNO_3 = Bi3NO_3 + NO + 2H_2O).$$

b. When effervescence has ceased, apply for 10 minutes a temperature approaching that of ebullition, and decant the solution.

c. Evaporate the solution down to fl ℥ 2.

From this point the preparation of the two salts differs, as follows:—

Carbonate.

d. Add the concentrated solution in small quantities at a time to a cold filtered solution of { **Carbonate of ammonium,** ℥ 6 **Distilled water,** O2, constantly stirring.

$$(4Bi3NO_3 + 3N_4H_{16}C_3O_8 = 12NH_4NO_3 + 2Bi_2CO_5 + 7CO_2).$$

e. Collect the precipitate on a calico filter, and wash until the washings are tasteless. Dry, first by slight pressure with the hands, and finally at a temperature not exceeding 150°.

Subnitrate.

d. Pour the concentrated solution into **distilled water,** C½. Subnitrate is precipitated, and supernitrate remains in solution.

$$(5Bi3NO_3 + 8H_2O = 4BiNO_4,H_2O + Bi3NO_3,8HNO_3).$$

e. Decant the fluid; add to the precipitate **distilled water,** C½; stir well together; decant the liquid in 2 hours; collect the precipitate on a calico filter; enfold it in the calico and press with the hands; and dry under 150°.

3. *Oxide of Bismuth.*

a. Mix { **Subnitrate of bismuth,** ℔ i / **Solution of soda,** O 4, } and boil for five minutes.

b. Allow the mixture to cool, and the oxide to subside.

c. Decant the supernatant liquid; wash the precipitate thoroughly with distilled water; and dry by the heat of a water-bath.

($2BiNO_4 + 2NaHO = Bi_2O_3H_2O + 2NaNO_3$).

4. *Citrate of Bismuth.*

a. Heat until { **Subnitrate of bismuth,** ℥ 5½ / dissolved } **Nitric acid,** fl ℥ ii.

b. Pour in water, with constant stirring, until the cloudiness produced by the water no longer rapidly disappears.

c. Dissolve **bicarbonate of sodium,** ℥ 8, in distilled water; add **citric acid,** ℥ 4; boil until all gas is expelled; and add the liquid to the solution of bismuth until no further precipitate is produced. Heat to boiling, occasionally stirring. Set aside to cool.

d. When cold, filter, and wash the precipitate from nitric acid. Dry over a water-bath.

5. *Citrate of Bismuth and Ammonium.* — This salt is obtained from the Solution of Citrate of Bismuth and Ammonium, as follows:—Evaporate the solution over a water-bath to the consistence of a syrup. Spread in thin layers on glass or porcelain plates, and dry under 100°. Remove the scales, and preserve them in a stoppered bottle.

Characters and Properties.— Under this heading the preparations of bismuth now under consideration may be arranged in two groups, namely:—

1. *Oxide* and *Simple Salts.*

a. These are all powders, but the *subnitrate* is heavy, and really in minute crystalline scales.

b. In colour they are white, except the *oxide*, which is dull lemon-yellow.

c. They are insoluble in water; soluble in nitric acid, diluted with half its volume of water, the *carbonate* with effervescence. The *citrate* is soluble in solution of ammonia, to a clear or nearly clear liquid.

d. They are blackened by H_2S.

2. *Citrate of Bismuth and Ammonium.*—This compound salt differs from the other preparations of bismuth in several particulars.

a. It occurs in small, shining, translucent scales.

b. It is very soluble in water.

c. Its taste is slightly metallic.

d. The solution yields ammonia when warmed with solution of a fixed alkali.

e. On ignition the salt chars and yields a residue for the most part black, but with a yellow surface, soluble in a little nitric acid.

IMPURITIES.—The chief of these are the impurities mentioned in connection with Purified Bismuth.

PHARMACY.—1. *Officinal Preparation :—*

Trochisci Bismuthi.—These are made in the usual way with gum acacia, mucilage, and refined sugar, but **rose water** is used. Each lozenge contains { Subnitrate of bismuth, gr. 2 / Carbonate of magnesium, gr. $2\frac{2}{3}$ / Precipitated carbonate of calcium, gr. $3\frac{1}{2}$.

2. *Incompatibles.*—The *subnitrate* is incompatible with the alkalies and their carbonates.

C. Liquor Bismuthi et Ammonii Citratis.

Source and Preparation.—Rub **citrate of bismuth,** gr. 800, to a paste with a little water; add **solution of ammonia** gradually and with stirring, until the salt is just dissolved; dilute with distilled water to form O j.

Characters and Properties:—

a. This is a colourless solution.
b. Sp. gr. = 1·07.
c. It has a slightly metallic taste.
d. It is neutral or slightly alkaline.
e. It is freely miscible with water.
f. Heated with alkalies it evolves ammonia, and yields a white precipitate.
g. Evaporated to dryness and the residue ignited, a charred mass with a yellow edge results; this treated with nitric acid affords a solution which should stand the tests for the impurities mentioned under "Purified Bismuth."

Quantitative Test. — 2 fluid drachms mixed with an ounce of distilled water, and treated with sulphuretted hydrogen in excess, yields a black precipitate, which, when washed and dried, weighs about 7 grains.

Action of Bismuth Group.

1. As external and local applications, in connection with the skin and certain mucous surfaces, the oxide, carbonate, or subnitrate of bismuth may be used as **absorbents, sedatives,** and

astringents. They are either employed in the form of powder, or made into lotions or ointments.

2. Internally all the preparations of bismuth act mainly as **gastric sedatives,** and **astringents** to the alimentary canal. They are also supposed to be **nervine tonics.**

Doses—Of Oxide, gr. 5 to 15; Carbonate or Subnitrate, gr. 5 to 20; Citrate or Citrate of Bismuth and Ammonium, gr. 2 to 5; Liquor Bismuthi et Ammonii Citratis, fl 3 ½ to 1.

XXI. CUPRUM—COPPER.

General Summary.—The B.P. recognizes the following :—

1. **Cuprum — Copper.** — Fine copper wire, about No. 25 wire-gauge, or about 0·02 inch. It is used for making the salts of copper, and in the preparation of Spiritus Ætheris Nitrosi.

2. **Salts of Copper.**
   1. *Cupri Nitras—Nitrate of Copper* = $Cu(NO_3)_2,3H_2O$.
   2. *Cupri Sulphas—Sulphate of Copper—Bluestone* = $CuSO_4,5H_2O$.

The chief facts concerning the officinal salts of copper may be presented in a tabular form, thus :—

Source and Preparation :—

Nitrate.	Sulphate.
By dissolving **copper** in **diluted nitric acid,** and evaporating the solution until crystallisation takes place on cooling to a temperature not lower than 70°.	By heating **sulphuric acid** and **copper** together, dissolving the soluble product in hot water, and evaporating the solution until crystallisation takes place on cooling ; or by dissolving **black oxide of copper** in hot diluted sulphuric acid, filtering, evaporating, and crystallising.

Characters and Properties :—

Nitrate.	Sulphate.
a. Deep blue prismatic crystals. *b*. Very deliquescent. *c*. Highly corrosive. *d*. With one-third of its weight of water it forms, below 70°, tabular crystals. With a very little more water it yields a styptic, caustic, corrosive fluid. *e*. The diluted aqueous solution is faintly acid.	*a*. Large oblique prismatic crystals ; deep blue. *b*. Has a strong styptic, metallic taste. *c*. Soluble in water (1 in 3); in glycerine (1 in 4). *d*. The solution in water is pale blue, and strongly reddens litmus. *e*. The crystals effloresce slightly in air.

INCOMPATIBLES.—Alkalies and their carbonates; lime-water; mineral salts (except sulphates); iodides; and most vegetable astringents.

ACTION.—1. Externally and locally the salts of copper are **escharotic** in their solid state, and the nitrate acts thus in a concentrated solution; they are **astringent** when in a more or less diluted solution.

2. Internally the sulphate only is employed, being **astringent** to the alimentary canal; **emetic** in large doses; and **nervine tonic.** It is also employed as an **antidote** in poisoning by phosphorus.

Dose—Of Sulphate, gr. $\frac{1}{3}$ to 2; as an emetic, gr. 5 to 10.

XXII. FERRUM—IRON.

General Summary.—Iron and its numerous officinal compounds and preparations may be conveniently arranged and discussed as follows:—

1. **Forms of Metallic Iron.**
   - *a. Annealed Iron Wire*, having a diameter of about 0·005 of an inch; or wrought iron nails.
   - *b. Ferrum Redactum—Reduced Iron.* Metallic iron, with a variable amount of oxide of iron.

2. **Ferri Peroxidum Hydratum—Peroxide of Iron,** Fe_2O_3,H_2O.

3. **Simple Salts of Iron.**
   - *a. Ferri Arsenias.* (*See* Arsenium).
   - *b. Ferri Carbonas Saccharata—Saccharated Carbonate of Iron.* Carbonate of iron, $FeCO_3,xH_2O$, mixed with peroxide of iron and sugar, the carbonate (if reckoned as anhydrous) forming about one-third of the mixture.
   - *c. Ferri Phosphas — Phosphate of Iron.* Ferrous Phosphate, $Fe_3(PO_4)_2,8H_2O$, at least 47 per cent.; with ferric phosphate and some oxide.
   - *d. Ferri Sulphas—Sulphate of Iron,* $FeSO_4,7H_2O$.
   - *e. Ferri Sulphas Exsiccata—Dried Sulphate of Iron,* $FeSO_4,H_2O$.
   - *f. Ferri Sulphas Granulata — Granulated Sulphate of Iron,* $FeSO_4,7H_2O$.

4. Compound or Scale Salts of Iron.

- *a. Ferri et Ammonii Citras—Citrate of Iron and Ammonium.*
- *b. Ferrum Tartaratum—Tartarated Iron.*
- *c. Ferri et Quininæ Citras—Citrate of Iron and Quinine.*

5. Solutions and Tinctures containing Compounds of Iron.

- *a. Liquor Ferri Acetatis Fortior—Strong Solution of Acetate of Iron* (Ferric Acetate).
- *b. Liquor Ferri Acetatis—Solution of Acetate of Iron.* A diluted solution of the above = 1 in 4.
- *c. Liquor Ferri Dialysati—Solution of Dialysed Iron.* A solution of highly basic ferric oxychloride, or chloroxide of iron, from which most of the acidulous matter has been removed by dialysis.
- *d. Liquor Ferri Perchloridi Fortior—Strong Solution of Perchloride of Iron* = 31·728 grains in fl 3 1.
- *e. Liquor Ferri Perchloridi—Solution of Perchloride of Iron.* A diluted solution of the above = 1 in 4.
- *f. Liquor Ferri Pernitratis—Solution of Pernitrate of Iron* = 7·865 grains in fl 3 1.
- *g. Liquor Ferri Persulphatis—Solution of Persulphate of Iron.*
- *h. Tinctura Ferri Acetatis—Tincture of Acetate of Iron.*
- *i. Tinctura Ferri Perchloridi—Tincture of Perchloride of Iron.*

6. **Special Officinal Preparations containing Iron.**

a. Emplastrum Ferri; made from *Peroxide.*
b. Mistura Ferri Aromatica—Aromatic Mixture of Iron—Heberden's Ink, containing *Tannate of Iron;* made from *Iron Wire.*
c. Mistura Ferri Composita—Compound Iron Mixture—Griffith's Mixture, containing *Hydrated Ferrous Carbonate.*
d. Pilula Ferri Carbonatis.
e. Pilula Ferri Iodidi.
f. Syrupus Ferri Iodidi.
g. Syrupus Ferri Phosphatis.
h. Trochisci Ferri Redacti.
i. Vinum Ferri.
j. Vinum Ferri Citratis.

A. Ferrum Redactum—Reduced Iron.

Source and Preparation.—The directions given in the B.P. for the preparation of reduced iron are somewhat complicated, but it consists essentially of two parts.

a. Ferric oxyhydrate is prepared by adding { **Strong solution of perchloride of iron,** 1 / **Distilled water,** 5 } to { **Solution of ammonia,** 1 / **Distilled water,** 5 }; washing the precipitate; and drying.

b. The resulting ferric oxyhydrate is thoroughly reduced by putting it in the middle part of an iron-tube, confined by plugs of asbestos; heating it in a furnace; passing through it a stream of dried **hydrogen gas,** and allowing it to cool, a slow current of hydrogen being still continued.

The reduced iron is to be enclosed in a dry well-stoppered bottle.

CHARACTERS AND PROPERTIES:—

a. Reduced iron is a fine greyish-black powder, exhibiting metallic streaks when rubbed with firm pressure in a mortar.

b. It is strongly attracted by the magnet.

c. It dissolves in hydrochloric acid with effervescence, hydrogen gas being evolved.

d. Ten grains added to an aqueous solution of { Iodide of potassium, gr. 50 / Iodine, gr. 50 }, and digested in a flask and gently heated, leave not more than 5 grains undissolved, which should be entirely soluble in hydrochloric acid.

INCOMPATIBLES.—It may be here stated once for all that iron and its preparations are chemically incompatible with tannic and gallic acids, as well as with vegetable drugs which contain these acids. They are, however, occasionally administered in combination.

B. PEROXIDE OF IRON.

SOURCE AND PREPARATION:—

a. Add { **Solution of persulphate of iron,** fl ℥ 4 / **Distilled water,** O1 } gradually to **solution of soda,** fl ℥ 33, stirring constantly and briskly. Let the mixture stand for two hours, stirring occasionally.

$$Fe_2 3SO_4 + 6NaHO = Fe_2O_3, 3H_2O + 3Na_2SO_4.$$

b. Collect the precipitate on a calico filter; and wash it from sulphate of sodium.

c. Dry under 212°, until it ceases to lose weight; then reduce it to fine powder.

Characters and Properties:—

a. Peroxide of iron is a reddish-brown powder, which is not magnetic.

b. It is destitute of taste.

c. It is insoluble in water, but dissolves completely, though slowly, with the aid of heat, in hydrochloric acid diluted with half its volume of water.

d. Heated to dull redness in a test-tube it yields about 10 per cent. of moisture.

C. Simple Salts of Iron.

Source and Preparation.—Taking the several simple salts of iron in the order in which they are obtained, they may be described as follows:—

1. *Sulphate.—a.* Add **Sulphuric acid,** fl ʒ 4, to { **Iron wire,** ʒ 4 / **Distilled water,** O 1½ } in a porcelain dish.

b. When disengagement of gas (hydrogen) has almost ceased, boil for ten minutes.

c. Filter through paper; set aside for 24 hours to crystallise; and dry the crystals on filtering paper on porous bricks.

2. *Dried Sulphate.*—Heat the **sulphate of iron** to 212°, until aqueous vapour ceases to be given off. Reduce the residue to a fine powder, and preserve it in a stoppered bottle.

3. *Granulated Sulphate.*—This form of sulphate is prepared by filtering the boiling solution of sulphate of iron (made as above) into a jar containing **rectified spirit,** fl ʒ 8, and stirring the mixture so that the salt shall separate in minute granular crystals. These are deprived by decan-

tation of adhering liquids; and dried on filtering paper on porous bricks, by exposure to the air.

4. *Saccharated Carbonate.*

a. Mix { **Sulphate of iron,** ℥ 2
Boiling distilled water, C ½
with { **Carbonate of ammonium,** ℥ 1¼
Boiling distilled water, C ½
in a deep cylindrical vessel, with brisk stirring.

b. Cover the vessel as accurately as possible; set aside for 24 hours; and separate the supernatant solution by a siphon from the precipitate which subsides.

c. Pour on **boiling distilled water,** C1, stir well, and after subsidence, again remove the clear solution.

d. Collect the resulting carbonate on a calico filter; press; rub it with **refined sugar,** ℥ 1, in a porcelain mortar; and dry under 212°.

(*Boiling water* is used to exclude air; and the *sugar* is mixed to preserve the carbonate against oxidation by the air).

5. *Phosphate.*

a. Dissolve { **Sulphate of iron,** ℥ 3
Boiling distilled water, fl ℥ 30
and { **Phosphate of sodium,** ℥ 2¾
Boiling distilled water, fl ℥ 30.

b. When the solutions have cooled to between 100° and 130°, *add the latter to the former,* pouring in also a solution of **bicarbonate of sodium,** ℥ ¾, in a little distilled water. Mix thoroughly.

c. Transfer the precipitate to a calico filter; wash it with hot distilled water from sulphate of sodium; and dry under 120°.

Characters and Properties:—

1. *Sulphates.*—The sulphates of iron may be considered together, as most of their properties are the same.

a. They present different appearances, namely:—

Sulphate.—Oblique rhombic prisms, of pale greenish-blue colour.

Dried Sulphate.—A powder, of greyish-cream colour.

Granulated Sulphate.—Small granular crystals, of pale greenish-blue colour.

b. They are soluble in water, forming a clear solution; insoluble in rectified spirit.

c. They have a styptic taste.

d. They are all more or less liable to become oxidised by exposure to the air, but especially the sulphate. Its crystals then present opaque rusty-coloured spots, and its solution precipitates an ochrey deposit.

2. *Saccharated Carbonate.*

a. This salt is in small coherent lumps, of a grey colour.

b. It is soluble, with effervescence, in warm hydrochloric acid, diluted with half its volume of water.

c. It has a sweet, very feebly chalybeate taste.

3. *Phosphate.*

a. This is an amorphous powder.

b. It has a slate-blue colour.

c. It is insoluble in water; soluble in hydrochloric acid.

Impurities.—Sulphate of iron may be present in the saccharated carbonate; arsenic in the phosphate; and copper in the sulphate.

Quantitative Tests.—A special test is directed to be applied to each of the salts of iron in this group, to determine the quantity of protosalt:

which they contain. It consists in dissolving the salt in some acid; and observing how many grain-measures of *Vol. solution of bichromate of potassium* are required to convert the protoxide into peroxide, which is indicated by its ceasing to give a blue precipitate with ferricyanide of potassium.

There are some differences in detail, which may be exhibited in a tabular form.

	Grain-measures of Vol. solution of Bichromate of Potassium.
Saccharated Carbonate, 30 grains dissolved in excess of phosphoric acid diluted with water	at least 287·5
Phosphate, 30 grains dissolved in hydrochloric acid	at least 279
Sulphate, 42·1 grains dissolved in water acidulated with sulphuric acid	about 500
Dried Sulphate, 10 grains dissolved in water acidulated with sulphuric acid	at least 191
Granulated Sulphate, 41·7 grains dissolved in water acidulated with sulphuric acid	500

Pharmacy.—1. The officinal preparations of these salts of iron will be considered with the others (*see* Special Officinal Preparations). The sulphate is an ingredient in Pilula Aloes et Ferri.

2. *Incompatibles.*—In addition to the general incompatibles of ferruginous preparations, special incompatibles have to be recognised in the case of particular salts, namely:—

Saccharated Carbonate.—Acids and acidulous salts.

Iodide.—Acids and acidulous salts; alkalies and their carbonates; lime-water.

D. Compound or Scale Salts.

Source and Preparation.—The scale preparations of iron may be considered together, as the earlier and final parts of the process of making them are similar in each case, and this may be conveniently divided into three stages.

a. In the first part of the process ferric hydrate is made, by adding gradually diluted **solution of persulphate of iron** to diluted **solution of ammonia,** stirring constantly and briskly; allowing the mixture to stand for two hours, stirring occasionally; putting the precipitate on a calico filter, draining, and washing, to remove sulphate of ammonium.

The proportions of the ingredients used are different in each case, as follows:—

Name of Salt.	Liquor Ferri Persulphatis.		Liquor Ammoniæ.
Citrate of Iron and Ammonium . .	fl℥10	Severally diluted with water, O2.	fl℥16 with water, O2
Tartarated Iron . .	fl℥6		fl℥11 „ „ O3
Citrate of Iron and Quinine	fl℥4½		fl℥8 „ „ O2

b. The second part of the process is special in each instance, thus:—

(i) *Citrate of Iron and Ammonium.*—Add the **ferric hydrate** to { **Citric acid,** ℥4 / **Distilled water,** fl℥8 } heated by a water-bath, stirring until nearly the whole has dissolved. Let the solution cool, and add **solution of ammonia,** fl℥5½.

(ii) *Tartarated Iron.*—Mix the **ferric hydrate** intimately with **acid tartrate of potassium,** in powder, ℥2, in a porcelain dish,

and let the mixture stand for 24 hours. Apply heat not above 140°; add gradually **distilled water,** O 1, and stir constantly until nothing more will dissolve.

(iii) *Citrate of Iron and Quinine.*—Add the **ferric hydrate** to { **Citric acid,** ℥ 3 and gr. 30 / **Distilled water,** ℥ 5 } heated by a water-bath; stir until dissolved; and add **quinine** (previously prepared from ℥ 1 of **sulphate of quinine**). Let the solution cool, and add in small quantities at a time { **Solution of ammonia,** fl ℥ 12 / **Distilled water,** fl ℥ 2 } stirring briskly, and allowing the quinine, which separates with each addition, to dissolve before adding more.

c. The last stage of the process consists in each case in filtering through flannel; evaporating to a syrupy consistence; drying in thin layers on flat porcelain or glass plates, at a temperature not exceeding 100°; removing the dry salt in flakes; and keeping it in a stoppered bottle.

CHARACTERS AND PROPERTIES. — The compound salts of iron present the common character that they are in thin transparent scales. Their *special* characters and properties may be thus tabulated:—

NAME OF SALT.	COLOUR.	SOLUBILITY.	REACTION.	TASTE.
Citrate of Iron and Ammonium.	Deep-red.	In water (2 in 1). Almost insoluble in rectified spirit.	Feebly acid.	Slightly sweetish and astringent.
Tartarated Iron.	Darker = deep-garnet.	In water (1 in 4). Sparingly in spirit.	Neutral.	Slightly sweetis and astringent.
Citrate of Iron and Quinine.	Greenish, golden-yellow; lustrous.	Water (2 in 1). Somewhat deliquescent.	Very slightly acid.	Bitter and chalybeate.

Special and Quantitative Tests.—Those applied to the scale salts in the B.P., may be thus indicated:—

1. **Remains after incineration = Peroxide of Iron.**

a. Citrate of Iron and Ammonium.—Incinerated with exposure to air leaves about 30 per cent., which is not alkaline to litmus.

b. Tartarated Iron.—50 grains incinerated at a red heat, the product washed with water, and again incinerated, weighs about 15 grains.

c. Citrate of Quinine and Iron.—Burned with exposure to air leaves a residue which, when moistened with water, is not alkaline to test-paper.

2. **Quantitative Test for Quinine** in **Citrate of iron and quinine** = 50 grains dissolved in fl ʒ i of water, and treated with slight excess of ammonia, give a white precipitate, which, when dissolved out by successive treatment of the fluid with ether or chloroform, the latter evaporated, and the residue dried until it ceases to lose weight, weighs 8 grains. The precipitate is almost entirely soluble in a little pure ether, and when burned leaves but a minute residue.

Pharmacy.— 1. *Officinal Preparation.*—The Ammonio-citrate of iron is contained in Vinum Ferri Citratis (*see* Special Officinal Preparations).

2. *Incompatibles.*—The following may be specially mentioned:—

Ammonio-Citrate.—Mineral acids; fixed alkalies.

Tartarated Iron.—Mineral acids; lime-water.

Citrate of Iron and Quinine.—Alkalies and their carbonates.

E. Solutions and Tinctures of Iron.

These liquid preparations containing iron in different forms constitute a most important group, and they may be conveniently discussed together.

Source and Preparation.—Under this heading the several preparations may be arranged according to the compounds of iron which they contain.

1. **Solution of Dialysed Iron.**—This solution is made as follows:—

a. Mix { **Strong solution of perchloride of iron,** fl ʒ 6 / **Distilled water,** O 2 }, and stir into the mixture sufficient diluted **solution of ammonia** to impart, after thorough agitation, a distinct ammoniacal odour.

b. Filter through calico; wash the precipitated ferric hydrate with distilled water; and squeeze to remove superfluous moisture.

c. Add the precipitate to **strong solution of perchloride of iron,** fl ʒ 1, stir thoroughly, warm gently, and when complete or nearly complete solution is obtained, filter if necessary, and place the liquid in a covered dialyser; then subject it to a stream of water in the usual manner until the solution in the dialyser is almost tasteless. The resulting solution should measure fl ʒ 28.

2. **Preparations containing Acetate of Iron.**

(1) *Strong Solution of Acetate.*

a. Gradually add { **Solution of persulphate of iron,** fl ʒ 5 / **Distilled water,** O 1 } to { **Solution of ammonia,** fl ʒ 8 / **Distilled water,** O 1 }; stir the whole thoroughly, taking care that ammonia is, even finally, in slight excess, as indicated

by the odour. Let the whole stand for 2 hours, stirring occasionally; put it on a calico filter, drain, wash the precipitated ferric hydrate from sulphate of ammonium, and again drain and squeeze it to remove superfluous moisture.

a. Dissolve the ferric hydrate in liquefied **glacial acetic acid,** fl ℥ 3; and make up to fl ℥ 10 with distilled water. Allow any insoluble matter to subside, and pour off the clear solution.

(2) *Solution of Acetate.*

Mix { **Strong solution of acetate,** fl ℥ 5
Distilled water, fl ℥ 20.

(3) *Tincture of Acetate.*

Mix { **Strong solution of acetate,** fl ℥ 5
Acetic acid, fl ℥ 1
Rectified spirit, fl ℥ 5
Distilled water, O 1.

Preserve in a stoppered bottle.

3. **Preparations containing Perchloride of Iron.**

(1) *Strong Solution of Perchloride.*

a. Dissolve { **Iron wire,** ℥ 4
Hydrochloric acid, fl ℥ 12½
Distilled water, fl ℥ 7 } by heating moderately until effervescence ceases, and then to boiling.

b. Filter, rinsing the flask and contents with a little water, and pouring this over the filter.

c. Add to the filtrate **hydrochloric acid,** fl ℥ 7; mix, and pour the solution in a slow continuous stream into **nitric acid,** fl ℥ 1½, evolution of red fumes being promoted, if necessary, by a slight application of heat.

d. Evaporate until no more fumes escape, and a precipitate begins to form; then add **hydrochloric acid,** fl ℥ 1, and sufficient **distilled water** to produce fl ℥ 17½.

(2) *Solution of Perchloride.*

Mix { **Strong solution of perchloride,** 1
Distilled water = 4 after admixture.

(3) *Tincture of Perchloride.*

Mix { **Strong solution of perchloride,** 1
Rectified spirit, 1
Distilled water, 2.

4. **Solution of Pernitrate of Iron.**

a. Dissolve { **Fine Iron wire,** ℥ 1
Nitric acid, fl ℥ 4½
Distilled water, fl ℥ 16 }, adding a little more water, if necessary, to moderate the action.

b. Filter the solution; and add as much **distilled water** as will make O 1½.

5. **Solution of Persulphate of Iron.**

a. Dissolve with the aid of heat { **Sulphate of iron,** ℥ 8
Sulphuric acid, fl ℥ 6
Distilled water, fl ℥ 10.

b. Mix { **Nitric acid,** fl ℥ 6
Distilled water, fl ℥ 2 }; and add to this, warmed, the solution of sulphate of iron.

c. Concentrate by boiling until, by the sudden disengagement of ruddy vapours, the colour changes from black to red; and so long as a drop of the solution gives a blue precipitate with ferricyanide of potassium, add a few drops of nitric acid, and renew the boiling, to convert all the sulphate into persulphate.

d. When the solution is cold, add **distilled water,** to make the quantity fl ℥ 11.

Characters and Properties.—Under this head it will suffice to notice the following general facts, and reference must be made to the B.P. if more detailed information is required with regard to individual preparations.

a. The solutions and tinctures of iron are all markedly coloured, the colour ranging from deep-red through dark-brown to pale-brown or orange-brown.

b. They are inodorous, except the preparations of the acetate, which have an acetous smell.

c. The solution of dialysed iron is free from any marked ferruginous taste. The remainder have a more or less astringent taste, especially the perchloride and persulphate, which are highly styptic. The acetate is also sour.

d. Each preparation has a definite sp. gr.

e. They are miscible with water or rectified spirit in all proportions.

Quantitative Tests. — The solutions treated with excess of solution of ammonia, give a reddish-brown precipitate which, when washed, dried, and ignited, weigh respectively as follows:—

	Grains.
Strong solution of acetate, fl ʒ 1, diluted with water, fl ʒ 2	= 5·7
Solution of dialysed iron, 100 grains	= 5
Strong solution of perchloride, fl ʒ 1, diluted with water, fl ʒ 2	= 15 to 16
Solution of pernitrate, fl ʒ 1	= 2·6
Solution of persulphate fl ʒ 1, diluted with water, fl ʒ 2	= 11·44

Impurities.—The solutions of ferric salts are liable to contain ferrous salts. Hydrochloric acid may be present in the dialysed iron. The perchloride is apt to contain arsenium.

Incompatibles.— *Solution and Tincture of Perchloride.*—Alkalies, lime-water, magnesia, and their carbonates; mucilage.

F. Special Officinal Preparations.

Some of the preparations to be considered in this group are merely compounds of those already discussed; others are quite independent. They will be taken in alphabetical order.

1. *Emplastrum Ferri—Chalybeate Plaster.*

Melt together { Burgundy pitch, 2 / Lead plaster, 8 }; add peroxide of iron, in fine powder, 1; and stir till the mixture stiffens on cooling.

2. *Mistura Ferri Aromatica*=Intense brown.

a. Macerate for three days in a closed vessel, agitating occasionally { Fine iron wire, ʒ ½ / Red cinchona bark, in powder, ʒ 1 / Calumba root, in powder, ʒ ½ / Bruised cloves, ʒ ¼ / Peppermint water, fl ʒ 12.

b. Filter, adding as much peppermint water to the filter as will make the product measure fl ʒ 12½.

c. Add { Tincture of orange peel, fl ʒ ½ / Compound tincture of cardamoms, fl ʒ 3.

3. *Mistura Ferri Composita*=Bluish-green; opaque.

a. Triturate so as to form a thin paste { Powdered myrrh, gr. 60 / Refined sugar, gr. 60 / Carbonate of potassium, gr. 30 / Rose water, a sufficiency.

b. Gradually add, continuing the trituration { Spirit of nutmeg, fl 3 4 / Rose water }, until about fl ʒ 8 of a milky liquid is formed.

c. Dissolve { Sulphate of iron, gr. 25 } and add { Rose water, remainder of fl ʒ 9½.

Mix thoroughly, and preserve the mixture as much as possible from contact with air.

(Excess of *carbonate of potassium* forms with *myrrh* a saponaceous compound, which suspends the *carbonate of iron* produced by double decomposition. The mixture is very liable to decompose, but the *sugar* retards this. It should be recently prepared).

4. *Pilula Ferri Carbonatis*=4 in 5.

Beat into a uniform mass { Saccharated carbonate of iron, 4; Confection of roses, 1.

5. *Pilula Ferri Iodidi*=1 in about $3\frac{1}{2}$.

a. Agitate in a strong stoppered ounce phial, until the froth becomes white { Fine iron wire, gr. 40; Iodine, gr. 80; Distilled water, ♏ 50.

b. Pour the fluid upon powdered refined sugar, gr. 70, in a mortar; triturate briskly; and gradually add powdered liquorice root, gr. 140.

6. *Syrupus Ferri Iodidi*=gr. 4·3 of iodide of iron in fl ʒ 1. Colourless if kept in well-filled bottles. Sp. gr. about 1·385.

a. Digest in a flask, slightly heating, and occasionally shaking, until the froth becomes white { Iron wire, 1; Iodine, 2; Distilled water, 3.

b. Prepare a syrup with { Refined sugar, 28; Distilled water, 10.

c. Add fl ʒ 2 of this syrup to the above solution, and boil gently for ten minutes; then filter the liquid while still hot into the remainder of the warm syrup, and mix.

(This preparation is best preserved by *suspending*

a coil of iron wire in the bottle containing it. As iodine is set free, it combines with the iron).

7. *Syrupus Ferri Phosphatis* = about gr. 1 of anhydrous phosphate of iron in fl ʒ 1. Colourless when fresh; becomes brown, and deposits on keeping. Sp. gr. about 1·305.

a. Dissolve separately and mix { Granulated sulphate of iron, gr. 224 / Distilled water, fl ʒ 4 } { Phosphate of sodium, gr. 200 / Distilled water, fl ʒ 4. }

b. Add bicarbonate of sodium, dissolved in a little water, and, after careful stirring, transfer the precipitate to a calico filter, and wash it from sulphate of sodium.

c. Mix the residue on the filter in a mortar with concentrated phosphoric acid, fl ʒ 1¼. Filter, add refined sugar, ʒ 8, and distilled water, and dissolve without heat. The whole to measure exactly fl ʒ 12.

8. *Trochisci Ferri Redacti*=gr. 1 in each. Iron-grey. Made in the usual way with refined sugar, gum, and mucilage.

9. *Vinum Ferri.* Intense olive-brown.

Macerate for thirty days in a closed vessel { Fine iron wire, ʒ 1 / Sherry wine, O 1, }

the iron being almost, but not quite wholly immersed in the wine, and the vessel frequently shaken, and the stopper removed; then filter.

10. *Vinum Ferri Citratis.* Deep-brown.

Dissolve { Citrate of iron and ammonium, gr. 160 / Orange wine, O 1, }

and let the solution remain for three days in a closed vessel, shaking occasionally; afterwards filter.

Action of Iron Group.

1. As external and local applications the solutions and tinctures of the persalts of iron are more or less powerful **astringents** and **styptics.** Emplastrum Ferri is a useful plaster for giving support to a part.

2. As internal remedies iron and its compounds and preparations have certain actions in common, but particular effects are produced by some special preparations. The chief facts relating to this subject may be indicated as follows:—

a. The entire ferruginous group may be said to act as **hæmatinics** or **blood-tonics,** and with few exceptions, they are all used for this purpose, the exact preparation selected depending upon the special circumstances of each case. They are also **general tonics;** and some of them are employed more particularly as **nervine tonics.**

b. Several of the preparations of iron are **astringent** or **styptic** when internally administered, and not only may they be used for these purposes, but it is important to recognise which of the compounds have such an action, as it may on this account not be desirable to give them. Those which are most obviously astringent are the solutions and tinctures of the persalts, and the different forms of sulphate of iron.

c. The hydrated peroxide is employed as an **antidote** in cases of poisoning by arsenic.

d. Some of the compounds of iron have special actions, depending upon its combination with other therapeutic agents. Thus the iodide produces the combined effects of iron and iodine, and is chiefly administered when a preparation of iron is required in scrofulous or tubercular subjects. The arseniate

is given mainly for the arsenic it contains; while the scale salts possess the actions of their several ingredients, in addition to those of iron.

Doses—Of Reduced Iron, gr. 1 to 5; Lozenges, 1 to 6.

Hydrated Peroxide, gr. 5 to 30.

Saccharated Carbonate, gr. 5 to 30; Pill, gr. 5 to 20.

Phosphate, gr. 5 to 10; Syrup, fl ʒ 1.

Sulphate, gr. 1 to 5; Dried, gr. ½ to 3; Granulated, gr. 1 to 5.

Tartarated Iron
Citrate of Iron and Ammonium
Citrate of Quinine and Iron
} gr. 5 to 10.

Solution of Dialysed Iron, ♏ 10 to 30.

Solution or Tincture of Perchloride, ♏ 10 to 30.

Solution of Pernitrate, ♏ 10 to 40.

Strong Solution of Acetate, ♏ 1 to 8.

Solution or Tincture of Acetate, ♏ 5 to 30.

Compound Mixture of Iron
Aromatic Mixture of Iron
} fl ʒ 1 to 2.

Pill of Iodide, gr. 3 to 8.

Syrup of Iodide, fl ʒ ½ to 1.

Wine of Iron
Wine of Citrate of Iron
} fl ʒ 1 to 4.

XXIII. HYDRARGYRUM—MERCURY.

General Summary.—Mercury and its officinal compounds and preparations may be arranged thus:—

1. **Hydrargyrum—Mercury.**

2. **Allotropic forms of Mercuric Oxide**=HgO.
   - *a. Hydrargyri Oxidum Flavum—Yellow Oxide of Mercury.*
   - *b. Hydrargyri Oxidum Rubrum—Red Oxide of Mercury.*

3. **Salts of Mercury.**
   - *a. Hydrargyri Subchloridum—Subchloride of Mercury—Calomel*=HgCl.
   - *b. Hydrargyri Perchloridum—Perchloride of Mercury—Corrosive Sublimate*=$HgCl_2$.
   - *c. Hydrargyri Iodidum Rubrum—Red Iodide of Mercury*=HgI_2.
   - *d. Hydrargyri Persulphas—Persulphate of Mercury*=$HgSO_4$.
   - *e. Hydrargyrum Ammoniatum—Ammoniated Mercury—White Precipitate*=NH_2HgCl.

4. **Officinal Preparations containing finely divided Mercury.**
   - *a. Hydrargyrum cum Cretâ—Grey powder*=gr. 1 in 3.
   - *b. Emplastrum Hydrargyri.*
   - *c. Emplastrum Ammoniaci cum Hydrargyro.*
   - *d. Linimentum Hydrargyri.*
   - *e. Pilula Hydrargyri—Blue pill*=gr. 1 in 3.
   - *f. Suppositoria Hydrargyri.*—Each contains gr. 5 of *Unguentum Hydrargyri.*
   - *g. Unguentum Hydrargyri.*
   - *h. Unguentum Hydrargyri Compositum—Scott's Ointment.*

5. Special Officinal Preparations containing Compounds of Mercury.

a. *Liquor Arsenii et Hydrargyri Iodidi—Solution of Iodide of Arsenium and Mercury—Donovan's solution*—(*See* ARSENIUM).

b. *Liquor Hydrargyri Nitratis Acidus*—*Solution of Acid Nitrate of Mercury*=Solution of Hg_2NO_3 in nitric acid.

c. *Liquor Hydrargyri Perchloridi*—*Solution of Perchloride of Mercury*=gr. ½ in fl ʒ i.

d. *Lotio Hydrargyri Flava—Yellow Mercurial Lotion—Yellow Wash.*—A precipitate of HgO with lime-water.

e. *Lotio Hydrargyri Nigra—Black Mercurial Lotion—Black Wash.*—A precipitate of Hg_2O with lime-water.

f. *Oleatum Hydrargyri—Oleate of Mercury.*

g. *Pilula Hydrargyri Subchloridi Composita—Compound Pill of Calomel—Plummer's Pill*=gr. i of calomel in 5.

h. *Unguentum Hydrargyri Oxidi Rubri.*

i. *Unguentum Hydrargyri Ammoniati.*

j. *Unguentum Hydrargyri Iodidi Rubri.*

k. *Unguentum Hydrargyri Nitratis*—*Citrine Ointment.*

l. *Unguentum Hydrargyri Nitratis Dilutum.*

m. *Unguentum Hydrargyri Subchloridi.*

A. Hydrargyrum—Mercury.

Mercury, in the metallic form, is introduced into the B.P. as an ingredient of several preparations containing it in the free state; and also for the purpose of making some of its compounds. Its method of preparation is not mentioned.

Mercury is described in the B.P. as a metal, fluid at ordinary temperature, brilliantly lustrous, and easily divisible into spherical globules. Volatilizes at a temperature below that of visible redness, leaving no residue. All the compounds of mercury have the property last mentioned in common, being entirely volatilized and sublimed by heat, or in certain cases they are decomposed.

B. Oxides of Mercury.

Source and Preparation:—

1. *Red* or *Nitric Oxide.*

   a. Dissolve **mercury,** ℥ 4, in { **Nitric acid,** fl ℥ 4½ **Distilled water,** fl ℥ 2, } and evaporate to dryness.

   $3Hg + 8HNO_3 = 3Hg2NO_3 + 2NO + 4H_2O.$

   b. Triturate **mercury,** ℥ 4, with the dry salt until the two are uniformly blended together.

   c. Heat the mixture in a porcelain dish, with repeated stirring, until acid vapours cease to be evolved.

   $Hg2NO_3 + Hg = 2HgO + 2NO_2.$

   (The *mercury* saves waste of oxygen).

2. *Yellow Oxide.*

a. Dissolve by aid of heat { **Perchloride of mercury,** ℥ 4 **Distilled water,** O 4.

b. Add this solution to **solution of soda,** O 2, and stir them together.

$$HgCl_2 + 2NaHO = 2NaCl + HgO + H_2O.$$

c. After subsidence, decant the supernatant liquid; wash the precipitate thoroughly on a calico filter; and dry by the heat of a water-bath.

CHARACTERS AND PROPERTIES.—The two officinal oxides of mercury are *chemically* the same, the difference between them being only in their physical appearance; their chief characters and properties may be thus indicated:—

a. Appearance { *Red oxide* is an orange-red powder, consisting of crystalline scales. *Yellow oxide* is a yellow powder.

b. Both forms are insoluble in water; readily soluble in hydrochloric acid.

c. They become decomposed by heat into oxygen and mercury.

C. SALTS OF MERCURY.

SOURCE AND PREPARATION.—This part of the subject may be best considered in the order in which the several salts are obtained.

1. *Persulphate*—Obtained by *direct combination.*

Heat { **Mercury,** ℥ 20 **Sulphuric acid,** fl ℥ 12 } in a porcelain vessel, stirring constantly until the metal disappears; then continue the heat until a dry white salt remains.

$$Hg + 2H_2SO_4 = HgSO_4 + SO_2 + 2H_2O.$$

2. *Perchloride—Corrosive Sublimate.*

a. Mix thoroughly in a mortar finely powdered { **Persulphate of mercury,** 20 **Dried chloride of sodium,** 16 **Black oxide of manganese,** 1.

b. *Sublime* this mixture in a suitable apparatus; $HgCl_2$ passes over and is condensed.

$$HgSO_4 + 2NaCl = HgCl_2 + Na_2SO_4.$$

(The MnO_2 prevents the formation of any calomel, HgCl, by setting free some Cl from the NaCl).

3. *Subchloride—Calomel.*

a. Rub together until no globules are visible { **Moistened persulphate of mercury,** ℥ 10 **Mercury,** ℥ 7.

(Hg_2SO_4 is formed).

b. Add dried **chloride of sodium,** ℥ 5, and thoroughly mix by continued trituration.

c. *Sublime* by a suitable apparatus into a large chamber, so that the calomel shall fall in fine powder on its floor.

$$Hg_2SO_4 + 2NaCl = Na_2SO_4 + 2HgCl.$$

d. Wash with boiling distilled water from $HgCl_2$, until the washings are not darkened by sulphydrate of ammonium; dry under 212°.

4. *Red Iodide.*—Obtained by *precipitation* from solution of perchloride by iodide of potassium.

a. Mix *boiling* aqueous solutions of { **Perchloride of mercury,** ℥ 4 in O 3 **Iodide of potassium,** ℥ 5 in O 1.

$$HgCl_2 + 2KI = 2KCl + HgI_2.$$

b. When cooled to the temperature of the air, decant the supernatant liquor; collect the precipitate on a filter; wash it twice with cold distilled water; and dry under 212°.

5. *Ammoniated Mercury.*

a. Dissolve by heat { **Perchloride of mercury,** ℥ 3 **Distilled water,** O 3, constantly stirring.

$$HgCl_2 + 2NH_3 = NH_2HgCl + NH_4Cl.$$

b. Pour this solution into { **Solution of ammonia,** fl ℥ 4 **Distilled water,** O 1.

c. Collect the precipitate on a filter; wash it with cold distilled water NH_4Cl; and dry under 212°.

(If the solution of ammonia be *added to* the solution of perchloride, a different compound is formed).

Characters and Properties.—These may be described according to the following plan.

1. *Persulphate.—a.* This is a heavy crystalline powder.

b. It is white, but rendered yellow by affusion of water.

2. *Chlorides.*—It will be useful to contrast the two chlorides of mercury, one character they have in common being that they are both *heavy*.

Calomel.	Corrosive Sublimate.
a. A dull-white powder, sometimes rendered yellowish by trituration in a mortar.	*a.* In masses of prismatic crystals. Colourless.
b. Nearly tasteless.	*b.* Highly acrid, metallic taste.
c. Insoluble in water, rectified spirit, or ether.	*c.* Soluble in water (1 in 19); boiling water (1 in 3); more soluble in alcohol, and still more so in ether, than in water.

3. *Iodide.—a.* The iodide of mercury is a *crystalline* powder (octahedra), of a vermillion colour.

b. It is almost insoluble in water; sparingly dissolves in alcohol, but freely in ether, and in an aqueous solution of iodide of potassium.

c. Heated gently on a sheet of paper over a spirit-lamp, it becomes yellow (crystals= rhomboidal prisms), resuming its scarlet colour on cooling. It is entirely volatilized at a temperature under redness.

4. *Ammoniated Mercury.—a.* This preparation is an amorphous powder, or sometimes it is made into small spiral cones.

b. It is white and opaque.

c. It has an unpleasant metallic taste.

d. Water has but little, and alcohol or ether no action upon ammoniated mercury.

e. It entirely volatilizes at a heat below redness.

f. Digested with caustic potash, it evolves ammonia.

g. It should yield 77·5 per cent. of metallic mercury.

Impurities.—The only impurity that needs special notice is the presence of corrosive sublimate in calomel. Warm ether shaken up with the impure salt in a bottle, leaves a residue of the corrosive sublimate on evaporation.

Incompatibles.—The salts of mercury that require special notice in relation to this point are:—

a. Calomel.—Solutions of potash, soda, and lime; iodide of potassium; nitro-hydrochloric acid; hydrocyanic acid.

b. Corrosive sublimate.—Alkalies and their carbonates; lime-water; soaps; iodide of potassium (but often given together, iodide of mercury being formed); tartar emetic; acetate of lead; nitrate of silver; albumen; decoction of bark.

D. Officinal Preparations of Mercury.

The numerous officinal preparations containing mercury or its compounds may conveniently be considered under three groups, namely:—

A. Preparations containing free Mercury.

1. *Emplastrum Hydrargyri.*—Blue colour.
   a. Add sublimed sulphur, gr. 8, gradually to heated olive oil, gr. 56, stirring until they unite.
   b. Add mercury, ℥ 3, and triturate until globules are no longer visible.
   c. Add to the mixture lead plaster, ℥ 6, previously liquefied, and mix the whole thoroughly.

2. *Emplastrum Ammoniaci cum Hydrargyro.*—Brownish lead colour. Made in the same way as Emplastrum Hydrargyri, except that instead of lead plaster, ammoniacum, ℥ 12, previously liquefied, is finally added.

3. *Linimentum Hydrargyri.*—A lead-coloured cream. Mix solution of ammonia, fl ℥ i, with liniment of camphor, fl ℥ ½; rub mercurial ointment, ℥ i, with liniment of camphor, fl ℥ ½; then mix them together. *Mercury* = 1 in 6.

4. *Pilula Hydrargyri.—Blue pill.*

a. Rub together { Mercury, 2 ; Confection of roses, 3 } until metallic globules are no longer visible.

b. Add powdered liquorice, 1, and mix well.

5. *Suppositoria Hydrargyri.*—Made by melting oil of theobroma, gr. 120, by sufficient heat; adding ointment of mercury, gr. 60; mixing thoroughly; and pouring into 15 grain moulds, or dividing into

12 equal parts after cooling. Each suppository contains gr. 5 of *mercurial ointment*.

6. *Unguentum Hydrargyri.*—Lead colour.

Rub together { Mercury, 16 / Prepared lard, 16 / Prepared suet, 1 } until metallic globules cease to be visible.

7. *Unguentum Hydrargyri Compositum.*

a. Mix { Yellow wax, 3 / Olive oil, 3 } by the aid of heat.

b. Incorporate ointment of mercury, 6, and when the mixture is nearly cold, add powdered camphor, $1\frac{1}{2}$, and stir the whole thoroughly together.

8. *Hydrargyrum cum Cretâ.*—*Grey powder* = 1 in 3.

Triturate till all globules disappear { Mercury, 1 / Prepared chalk, 2.

B. **Preparations made from Mercury.**

1. *Liquor Hydrargyri Nitratis Acidus.*—Colourless; strongly acid.

a. Dissolve mercury, ℥ 4, in { Nitric acid, fl ℥ 5 / Water, fl ℥ $1\frac{1}{2}$ } without heat.

$$3Hg + 8HNO_3 = 3(Hg_2NO_3) + 4H_2O + 2NO.$$

b. Boil gently for 15 minutes, (to ensure the formation of pernitrate, and to expel NO); cool; and preserve the solution in a stoppered bottle away from the light.

2. *Unguentum Hydrargyri Nitratis.*—Lemon-colour.

a. Dissolve { Mercury, 4 / Nitric acid, 12 } by gentle heat.

b. Melt by the water-bath { Prepared lard, 15 / Olive oil, 32 } in a large porcelain vessel.

c. Add the solution of mercury while at about 212°, and mix thoroughly. Heat if necessary, until the mixture froths up; and stir until it is cold.

C. Preparations of Compounds of Mercury.

1. *Liquor Hydrargyri Perchloridi* = Colourless.
Contains gr. $\frac{1}{16}$ of perchloride in fl ʒ 1.

Dissolve { Perchloride of mercury, gr. 10
Chloride of ammonium, gr. 10
Distilled water, O 1.

(The *chloride of ammonium* aids solution).

2. *Lotio Hydrargyri Flava.*

Mix { Perchloride of mercury, gr. 18
Lime-water, fl ʒ 10.

The *yellow oxide* is precipitated.

$$HgCl_2 + Ca2HO = HgO + CaCl_2 + H_2O.$$

3. *Lotio Hydrargyri Nigra.*

Mix { Subchloride of mercury, gr. 30
Lime-water, fl ʒ 10.

The *black oxide* is precipitated.

$$2HgCl + Ca2HO = Hg_2O + CaCl_2 + H_2O.$$

4. *Oleatum Hydrargyri.*—Gradually add yellow oxide of mercury, 1, to oleic acid, 9, kept stirred in a mortar, and triturate occasionally until it is all dissolved.

Light-brown, oleaginous, semi-solid.

5. *Pilula Hydrargyri Subchloridi Composita.*—Bright-orange. Contains gr. 1 of calomel in 5.

Triturate { Subchloride of mercury, 1
Sulphurated antimony, 1.

Add { Powdered guaiacum resin, 2
Castor oil, 1,

and beat the whole into a uniform mass.

6. *Unguenta.*—There are five ointments made from mercurial compounds, which may be thus arranged in alphabetical order :—

a. Unguentum Hydrargyri Ammoniati.

Mix { Ammoniated mercury, 1
Simple ointment, 3.

b. Unguentum Hydrargyri Iodidi Rubri.

Mix { Red iodide of mercury, in fine powder, gr. 16
Simple ointment, ℥ i.

c. Unguentum Hydrargyri Nitratis Dilutum.

Mix { Nitrate of mercury ointment, 1
Soft paraffin, 2.

d. Unguentum Hydrargyri Oxidi Rubri.

Melt { Hard paraffin, ℥ ¼
Soft paraffin, ℥ ¾ } ; and when the mixture in cooling begins to thicken, add oxide of mercury, in very fine powder, gr. 62, in a glass or porcelain mortar, and mix thoroughly.

e. Unguentum Hydrargyri Subchloridi.

Mix { Subchloride of mercury, gr. 80
Benzoated lard, ℥ i.

Action of Mercury Group.

The effects produced by mercury and its compounds and preparations may be summarized in the following way:—

1. *External and local applications.*

a. The solution of acid nitrate of mercury is a powerful **escharotic** or **caustic**; the red oxide has a mild action of a similar kind, and so has the perchloride, but it is not employed for this purpose.

b. The perchloride of mercury is a valuable **antiseptic** and **disinfectant.** This salt in solution, and the ammoniated mercury in the form of ointment, are **parasiticides,** being especially used to destroy pediculi in connection with hairy parts of the body.

c. A large number of the preparations of mercury or its compounds intended for external or local application act as **local stimulants** and

alteratives, affecting ulcerated surfaces, diseases of the eyelids, and certain skin diseases, and promoting the absorption of inflammatory and syphilitic products.

d. Several of these preparations are also used locally, with the view of getting the mercury absorbed, so that it may produce its **specific** effects upon the system. They are especially thus employed in connection with the skin, in the form of inunction or fumigation. Calomel is generally used for the purpose of fumigation.

2. *Internally* only a comparatively small number of the mercurial preparations are employed, and their actions may be thus indicated :—

a. They all act upon the alimentary canal, and are **sialagogue** and **purgative,** some of them tending to cause more or less severe gastric and intestinal irritation. Grey powder, blue pill, and calomel are the preparations given to act on the bowels. With regard to the liver, they are undoubtedly **cholagogues,** but the perchloride seems to be the only compound which is a true **hepatic stimulant,** blue pill, grey powder, and calomel being apparently merely **bile-expellents,** but they are often of conspicuous service. Minute doses of calomel or grey powder have been recommended in certain forms of vomiting and diarrhœa.

b. All mercurial preparations which are administered internally have a marked **alterative** action, and are generally regarded as having a **specific** effect upon syphilis. As already intimated, some external applications are employed for this purpose, the mercury becoming absorbed. The suppository of mercury may be used to produce a similar effect; and the perchloride is occasionally injected subcutaneously. In connection with this alterative action, some of the mercurials

are supposed to be more or less **sudorific** and **diuretic,** and blue pill in a certain combination is believed to have a distinct and positive effect upon the kidneys. Some of the compounds and preparations of mercury contain other ingredients, which aid its alterative action, or have peculiar effects of their own.

c. Mercury when administered in excess, or in certain individuals even in small quantity, produces a condition termed **mercurialism,** the symptoms of which are profuse salivation; swelling and redness of the gums, and sometimes of the tongue and salivary glands; loosening of the teeth; a peculiar odour of the breath; and a metallic taste. If carried beyond this point ulceration of the mucous membrane, and even necrosis of the jaws may be caused. The development of these phenomena has to be carefully watched for when employing mercury for its effects on the system. Chronic poisoning by mercury gives rise to emaciation and anæmia, low fever, inflammation of periosteum and bone, and various nervous symptoms.

Doses—The doses of the preparations of mercury administered internally are :—

Of Pill of Mercury—Blue pill, gr. 3 to 8.

Mercury with Chalk—Grey powder, gr. 3 to 8.

Subchloride, gr. $\frac{1}{2}$ to 1 as an alterative, gr. 1 to 5 as a purgative; Compound pill, gr. 5 to 10.

Perchloride, gr. $\frac{1}{16}$ to $\frac{1}{8}$; Solution, fl 3 $\frac{1}{2}$ to 2.

Red iodide, gr. $\frac{1}{16}$ to $\frac{1}{4}$.

XXIV. PLUMBUM—LEAD.

General Summary.—The officinal compounds and preparations of lead include:—

1. **Plumbi Oxidum.—Oxide of Lead** = PbO.

2. **Salts of Lead.**
   - *a. Plumbi Acetas—Acetate of Lead* $= Pb(C_2H_3O_2)_2, 3H_2O$.
   - *b. Plumbi Carbonas—Carbonate of Lead* $= 2PbCO_3PbO, H_2O$.
   - *c. Plumbi Iodidum—Iodide of Lead* $= PbI_2$.
   - *d. Plumbi Nitras—Nitrate of Lead* $= Pb(NO_3)_2$.

3. **Special Officinal Preparations of Compounds of Lead.**
   - *a. Emplastrum Plumbi.*
   - *b.* ,, *Plumbi Iodidi.*
   - *c. Liquor Plumbi Subacetatis—Solution of Subacetate of Lead—Goulard Extract* $= Pb_2O(C_2H_3O_2)_2$.
   - *d. Liquor Plumbi Subacetatis Dilutus—Goulard Water.*
   - *e. Glycerinum Plumbi Subacetatis.*
   - *f. Pilula Plumbi cum Opio.*
   - *g. Suppositoria Plumbi Composita.*
   - *h. Unguentum Plumbi Acetatis.*
   - *i.* ,, ,, *Carbonatis.*
   - *j.* ,, ,, *Iodidi.*
   - *k.* ,, *Glycerini Plumbi Subacetatis.*

A. Oxide of Lead. Litharge.

Source and Preparation.—No directions are given on this point in the B.P., but this preparation is made by roasting lead in a current of air.

CHARACTERS AND PROPERTIES.—*a.* Oxide of lead occurs in heavy scales, of a pale brick-red colour.

b. It is insoluble in water; completely soluble in diluted nitric and acetic acids, without effervescence.

IMPURITIES.—Copper and iron.

PHARMACY.—Oxide of lead is used in making some of the other preparations; and it is also an ingredient in Emplastrum Saponis Fuscum.

B. SALTS OF LEAD.

SOURCE AND PREPARATION.—The B.P. only gives directions for the preparation of the acetate and iodide, but the others may be mentioned.

1. *Acetate.*—By *solution* of the oxide in acid.

a. Dissolve **oxide of lead,** ℥ 24, in fine powder, in { **Acetic acid,** O 2 / **Distilled water,** O 1 } with the aid of a little heat.

$$PbO + 2HC_2H_3O_2 = Pb2C_2H_3O_2 + H_2O.$$

b. Filter; evaporate till a pellicle forms; and crystallise, adding a little acetic acid if the fluid has not a distinctly acid reaction.

c. Drain and dry the crystals on filtering paper, without heat.

2. *Carbonate.*—By exposing sheets of lead to the fumes of acetic and carbonic acids, evolved from spent tan, vinegar, and decaying organic matter.

3. *Nitrate.*—Made by dissolving oxide of lead in dilute nitric acid, filtering, and crystallising.

4. *Iodide.*—Prepared by *double decomposition.*

a. Mix { **Nitrate of lead,** ℥ 4 / **Distilled water,** O 1½ } dissolved by heat, with { **Iodide of potassium,** ℥ 4 / **Distilled water,** O ½.

$$Pb(NO_3)_2 + 2KI = PbI_2 + 2KNO_3.$$

b. Collect the precipitate on a filter; wash it with distilled water; and dry in a warm place.

Characters and Properties.—The salts of lead present individually very definite characters and properties, and they must be separately described.

1. *Acetate—Sugar of Lead.*

a. This salt occurs in white crystalline masses, moderately heavy.

b. It has a marked acetous odour; with a sweet astringent taste.

c. It is soluble in water (10 in 25); also in alcohol.

d. The aqueous solution slightly reddens litmus; is clear, or has only a slight milkiness, which disappears on the addition of acetic acid; and does not form an opaque white jelly with gum mucilage.

e. Acetate of lead is slightly efflorescent. Small crystals may be seen on the inside of the containing bottle.

2. *Carbonate—White Lead.*

a. This is a soft heavy white powder.

b. It is insoluble in water; soluble, with effervescence, in diluted acetic acid, without leaving any residue.

c. The powder is blackened by H_2S.

3. *Iodide.*—Nothing is mentioned in the B.P. as to the characters of this salt, but it may be mentioned that it is a bright yellow powder, which has neither taste nor odour; sparingly soluble in cold water, entirely in boiling water, being deposited on cooling in golden crystalline scales; also soluble in alcohol, solution of potash, and alkaline iodides.

4. *Nitrate.*—*a.* This salt is in octahedral crystals, which are colourless, and nearly opaque; permanent in the air.

b. It is soluble in water and alcohol.

c. It has a sweetish and astringent taste.

d. The aqueous solution added to sulphate of indigo discharges its colour.

QUANTITATIVE TEST.—*Acetate.* 38 grains dissolved in water require for complete precipitation 200 grain-measures of *Vol. solution of oxalic acid.*

INCOMPATIBLES.—*Acetate.* Sulphuric and tannic acids, and their salts.

C. OFFICINAL PREPARATIONS OF LEAD.

1. *Emplastrum Plumbi.* Pale yellow.

Boil together gently by the heat of a steam bath { Oxide of lead, in fine powder, 5; Olive oil, 10; Water, 5,

and keep them simmering for four or five hours, stirring constantly until the product acquires a proper consistence, adding more water if necessary.

2. *Emplastrum Plumbi Iodidi.* Pale orange.

Melt { Lead plaster, 8; Resin, 1 } and mix intimately { Powdered iodide of lead, 1.

3. *Glycerinum Plumbi Subacetatis.*

a. Mix and boil for a quarter of an hour { Acetate of lead, ℥ 5; Oxide of lead, in powder, ℥ 3½; Glycerine, O 1; Distilled water, fl ℥ 12.

b. Filter; and evaporate until the water is dissipated.

4. *Liquor Plumbi Subacetatis.*

a. Boil for half an hour { Acetate of lead, 5; Powdered oxide of lead, 3½; Distilled water, 20. } constantly stirring.

b. Filter; and when cold add water to make up 20. Keep in stoppered bottles.

CHARACTERS.—This solution is a dense clear colourless liquid; with alkaline reaction, and sweet astringent taste; becoming turbid by exposure to the air; and forming with mucilage of acacia an opaque white jelly. Sp. gr. 1·275.

QUANTITATIVE TEST.—284·5 grains require for perfect precipitation 500 grain-measures of *Vol. solution of oxalic acid.*

INCOMPATIBLES.—Alkalies; lime water or hard water; mineral acids and their salts; vegetable acids; iodide of potassium; astringents; opium; albuminous fluids.

5. *Liquor Plumbi Subacetatis Dilutus.*

Mix and filter through paper { Solution of subacetate of lead, 1; Rectified spirit, 1; Distilled water, 79.

6. *Pilula Plumbi cum Opio.*

Beat into a uniform mass { Acetate of lead, in fine powder, 6; Opium, in fine powder, 1; Confection of roses, 1.

7. *Suppositoria Plumbi Composita.*

Made with oil of theobroma into 15-grain suppositories, each containing { Acetate of lead, gr. 3; Opium, gr. 1.

8. *Unguenta.*—The several ointments containing preparations of lead are made as follows:—

a. Unguentum Plumbi Acetatis.

Mix thoroughly { Acetate of lead, in fine powder, gr. 12; Benzoated lard, ℥ 1.

b. Unguentum Plumbi Carbonatis.

Mix thoroughly { Carbonate of lead, in fine powder, gr. 62
Simple ointment, ʒ 1.

c. Unguentum Plumbi Iodidi.

Mix thoroughly { Iodide of lead, in fine powder, gr. 62
Simple ointment, ʒ 1.

d. Unguentum Glycerini Plumbi Subacetatis.

Melt { Hard paraffin, ʒ 6
Soft paraffin, ʒ 18 } ; then add glycerine of subacetate of lead, ʒ 4½, and stir until the mixture has cooled.

Action of Lead Group.

The actions of the preparations and compounds of lead may be readily summed up thus :—

1. The large majority of them are for external use, and they mainly act as local **astringents** and **sedatives.** A lotion made with the solution of subacetate is a useful **refrigerant.** The iodide of lead is a local **stimulant** and **alterative.** Lead plaster is non-irritating, and is useful for the purpose of giving support to a part.

2. The acetate is the only preparation of lead administered internally. It is a powerful **astringent** and **styptic ;** and is also regarded as a **vascular sedative.** The pill and suppository are useful preparations, on account of the combination of the acetate of lead with opium.

Doses—Of Acetate, gr. 1 to 4; Pill of Lead with Opium, gr. 3 to 5.

XXV. ZINCUM—ZINC.

GENERAL SUMMARY.—The B.P. recognises the following forms and compounds of zinc:—

1. **Metallic Zinc.** { *Zincum—Zinc of Commerce.* / *Zincum Granulatum.*
2. **Zinci Oxidum—Oxide of Zinc** = ZnO.
3. **Salts of Zinc.**
   - *a. Zinci Acetas—Acetate of Zinc* = $Zn(C_2H_3O_2)_2$, $2H_2O$.
   - *b. Calamina Præparata — Prepared Calamine*—Native Carbonate of Zinc.
   - *c. Zinci Carbonas—Carbonate of Zinc* = $ZnCO_3$, $(Zn2HO)_2$, H_2O.
   - *d. Zinci Chloridum—Chloride of Zinc* = $ZnCl_2$.
   - *e. Zinci Sulphas—Sulphate of Zinc* = $ZnSO_4$, $7H_2O$.
   - *f. Zinci Sulphocarbolas — Sulphocarbolate of Zinc* = $Zn(C_6H_5SO_4)_2$, H_2O.
   - *g. Zinci Valerianas — Valerianate of Zinc* = $Zn(C_5H_9O_2)_2$.
4. **Officinal Preparations of Compounds of Zinc.**
   - *a. Liquor Zinci Chloridi* (Burnett's Disinfecting Fluid).
   - *b. Oleatum Zinci—Oleate of Zinc.*
   - *c. Unguentum Zinci.*
   - *d.* ,, ,, *Oleati.*
   - *e.* ,, *Calaminæ.*

A. METALLIC ZINC.

Zinc of Commerce is introduced into the B.P. for the purpose of making granulated zinc.

Granulated Zinc is used for making certain of the compounds of zinc. It is prepared by melting zinc in an earthen crucible; pouring it in a very thin stream into about two gallons of cold water; draining and drying.

B. Oxide of Zinc.

Source and Preparation.—Expose **carbonate of zinc** to dull red heat in a loosely covered Hessian crucible, until a portion *taken from the centre*, and cooled, no longer effervesces when moistened with water and dipped into diluted sulphuric acid. When cool, transfer the product to stoppered bottles.

Oxide of zinc may also be prepared from metallic zinc by combustion.

Characters and Properties.—

a. Oxide of zinc is a soft, nearly white powder, becoming pale yellow when heated.

b. It is tasteless and odourless.

c. It is insoluble in water, but dissolves, without effervescence, in diluted nitric acid.

Impurities.—Sulphate, chloride, and lead.

C. Salts of Zinc.

Source and Preparation.—Under this heading the several salts of zinc may be considered in the order in which they are obtained.

1. *Prepared Calamine.*—This is native carbonate of zinc, calcined in a covered earthen crucible at a moderate temperature, powdered, and freed from gritty particles by elutriation.

2. *Chloride.*—Prepared from the metal, by *direct combination.*

a. Add by degrees { **Hydrochloric acid,** fl ℥ 44 / **Distilled water,** O 1, to **granulated zinc,** ℔ 1, in a porcelain basin, and aid the action by gently warming on a sand-bath until gas is no longer evolved.

$$Zn + 2HCl = H_2 + ZnCl_2.$$

b. Boil for half an hour, adding water for loss; and allow it to stand on a cool part for 24 hours, stirring frequently.

If, on testing the liquid, it be found to contain iron or lead, these impurities must be got rid of by the following process:—

c. Filter into a gallon bottle; pour in **solution of chlorine** by degrees, with frequent agitation, until the fluid acquires a permanent odour of chlorine.

d. Add **carbonate of zinc,** in small quantities at a time, and with renewed agitation, until a brown sediment appears, and the whole of the iron or lead is thus precipitated.

e. Filter through paper into a porcelain basin; evaporate until a portion of the liquid withdrawn on the end of a glass rod, and cooled, forms an opaque white solid. Pour it into moulds; and when the salt has solidified, but before it has cooled, place it in closely stoppered bottles.

3. *Sulphate.*—Prepared from the metal, by *direct combination.*

a. Pour { **Sulphuric acid,** fl ℥ 12 / **Distilled water,** O 4 } on **granulated zinc,** ℥ 16.

When effervescence has nearly ceased, aid the action by heat.

$$Zn + H_2SO_4 = ZnSO_4 + H_2.$$

b. If, on testing, the liquid is found to contain iron, it must be filtered, and treated with **chlorine water** and **carbonate of zinc,** as in preparing chloride of zinc.

c. Filter the solution; evaporate till a pellicle forms; and set aside to crystallise. Dry the crystals by exposure to the air on filtering paper placed on porous tiles. More crystals may be obtained by again evaporating the mother liquor.

4. *Carbonate.*- Prepared from the sulphate, by *double decomposition.*

a. Pour { **Sulphate of zinc,** ℥ 10 / **Boiling distilled water,** O1, } into { **Carbonate of sodium,** ℥ 10½ / **Boiling distilled water,** O1, } stirring diligently.

b. Boil for 15 minutes after effervescence has ceased; and let the precipitate subside.

c. Decant the supernatant liquor; wash the precipitate from sulphate of sodium by repeated affusions of hot distilled water; collect it on calico, drain, and dry at a moderate temperature.

5. *Valerianate.*—Prepared from the sulphate, by *double decomposition.*

a. Mix nearly boiling solutions of { **Sulphate of zinc,** ℥ 5½ / **Distilled water,** O 2. } { **Valerianate of sodium,** ℥ 5 / **Distilled water,** O 2. }

$$ZnSO_4 + 2NaC_5H_9O_2 = Na_2SO_4 + Zn2C_5H_9O_2.$$

b. Cool; and skim off the crystals formed.

c. Evaporate the mother liquor under 200° to ℥ 4; cool; and remove more crystals.

d. Drain the crystals on a paper filter; wash with a small quantity of cold distilled water from sulphate of sodium; drain again; and dry on filtering paper at ordinary temperatures.

Valerianate of zinc may also be prepared by saturating valerianic acid with carbonate of zinc.

6. *Acetate.*—Made from the carbonate, by *solution.*

a. Add **carbonate of zinc,** ℥ 2, in successive portions, to { **Acetic acid,** fl ℥ 3 / **Distilled water,** fl ℥ 6 } in a flask.

b. Heat gently, and add by degrees more acetic acid till the carbonate is dissolved.

c. Boil for a few minutes; filter while hot; and set aside to crystallise. Decant the mother liquor, evaporate to one half, and again set aside to crystallise. Drain and dry the crystals by exposure to the air at ordinary temperatures, spread on filtering paper on a porous tile.

7. *Sulphocarbolate.*—May be obtained by heating a mixture of **carbolic acid** and **sulphuric acid,** saturating the product with **oxide of zinc,** evaporating and crystallising.

Characters and Properties.—In describing their characters, the salts of zinc may be sub-divided into two groups, namely:—

A. **Non-crystalline salts.**

1. *Carbonate.*—*a.* The carbonate of zinc is a white powder.

b. It is odourless and tasteless.

c. It is insoluble in water; soluble in diluted nitric acid, with effervescence, and without residue.

2. *Prepared Calamine.*—This is a pale pinkish-brown powder, without grittiness; almost entirely soluble, with effervescence, in acids.

3. *Chloride.*—*a.* This salt occurs in rods or tablets, which are colourless and opaque.

b. It is very deliquescent and caustic.

c. It dissolves almost entirely in water (10 in 4), alcohol, or ether.

B. **Crystalline Salts.**

1. *Acetate.—a.* The acetate of zinc is in thin crystalline plates, which are translucent and colourless, with a pearly lustre.
b. It is soluble in water (10 in 25).
c. It has a sharp unpleasant taste.
2. *Sulphate.—a.* Sulphate of zinc occurs in small prismatic crystals, like sulphate of magnesia, which are colourless and transparent.
b. It is soluble in water (10 in 7); and is efflorescent.
c. It has a strong metallic styptic taste.
3. *Sulphocarbolate. — a.* This salt is in tabular crystals, colourless and transparent.
b. They dissolve in about twice their weight of rectified spirit or water; and are efflorescent.
4. *Valerianate.—a.* The valerianate of zinc is in tabular crystals, which are white, brilliant, and pearly.
b. They have a feeble odour of valerianic acid; and a metallic taste.
c. This salt is scarcely soluble in cold water or ether, soluble in hot water and alcohol.
d. When heated with diluted sulphuric acid, valerianic acid is distilled, which, when mixed with solution of acetate of copper, does not immediately affect the transparency of the fluid, but forms after a time oily drops, which gradually pass into a bluish-white crystalline deposit = valerianate of copper.

Impurities.—The following are the chief impurities of the salts of zinc :—

Acetate.—Sulphates, chlorides, lead.
Carbonate.—Sulphates and chlorides.
Chloride.—Sulphate, lime, iron and lead.
Sulphate.—Iron, lead, and copper.
Sulphocarbolate.—Sulphate, lime.
Valerianate.—Sulphate, butyric acid.

INCOMPATIBLES.—The incompatibles of preparations of zinc are alkalies and their carbonates; lime-water; acetate of lead; nitrate of silver; astringent vegetable infusions or decoctions; and milk.

D. OFFICINAL PREPARATIONS OF ZINC.

1. *Liquor Zinci Chloridi.*—This solution is prepared in the same way as the chloride, except that in the final part of the process the filtered liquid is evaporated until it is reduced to the bulk of two pints.

CHARACTERS.—A colourless fluid, of astringent and sweetish taste; sp. gr. 1·460.

2. *Oleatum Zinci—Oleate of Zinc.*

Stir { Oxide of zinc, 1 / Oleic acid, 9 } together; and allow the the mixture to stand for two hours; then heat on a water-bath until the oxide is dissolved.

3. *Unguentum Zinci.*

Add { Oxide of zinc, gr. 80, to / Melted benzoated lard, ʒ 1, } and stir till cool.

4. *Unguentum Zinci Oleati.*

Mix by the aid of a little heat { Oleate of zinc, 1 / Soft paraffin, 1, } and stir until nearly cold.

ACTION OF ZINC GROUP.

The action of the zinc compounds which are used medicinally are as follows:—

1. The solution of chloride of zinc is a valuable **deodorant** and **disinfectant,** and is much employed for these purposes.

2. Several of the preparations of zinc are used as external or local applications. The oxide and prepared calamine, in the form of powders, are **absorbent;** the several ointments are somewhat **astringent** and **sedative,** and promote the healing of wounds or ulcers. The chloride is a powerful **escharotic;** its solution is **antiseptic,** and much diluted it may be employed as an **astringent.** Sulphate of zinc is a mild **caustic,** and in solution it is also employed as an **astringent.** The sulphocarbolate is **antiseptic** and **astringent.**

3. Internally the oxide and acetate of zinc are **astringents.** The oxide is much employed as an **anhydrotic.** Sulphate and acetate of zinc act as simple **emetics** in full doses. All the compounds of this metal which are administered internally are regarded as **nervine tonics,** but especially the valerianate.

Doses—Of Oxide of Zinc, gr. 2 to 10.

Acetate, gr. 1 to 2; as an emetic, gr. 10 to 20.

Sulphate, gr. 1 to 3; as an emetic, gr. 10 to 30.

Valerianate, gr. 1 to 3.

XXVI. ORGANIC CHEMICAL PRODUCTS.

A. Acidum Hydrocyanicum Dilutum—Diluted Hydrocyanic Acid.

A Solution of 2 per cent. of HCN gas in water.

Source and Preparation.—From ferrocyanide of potassium, by the following process:—

a. Mix { **Sulphuric acid,** fl ℥ 1 / **Distilled water,** fl ℥ 4.

b When cool, add { **Ferrocyanide of potassium,** ℥ 2¼ / **Distilled water,** fl ℥ 10.

c. Distil slowly into a cold receiver containing distilled water, fl ℥ 8, until the whole measures fl ℥ 17, and add distilled water to the required strength.

$2K_4FeCy_6+6H_2SO_4=FeK_2FeCy_6+6KHSO_4+6HCy$.

Diluted hydrocyanic acid should be kept in well-corked bottles, tied over with impervious tissue. The bottles should be inverted when not in use, and be kept in a dark place.

Characters and Properties:—

a. Diluted hydrocyanic acid is a colourless liquid.

b. It has a powerful and peculiar odour.

c. Its taste is at first cooling; then irritating.

d. It only slightly and transiently reddens litmus paper.

e. Sp. gr. 0·997.

f. A fluid drachm evaporated in a platinum dish leaves no fixed residue.

Impurities.—Sulphuric and hydrochloric acids. The presence of a trace of mineral acid is said to prevent decomposition.

QUANTITATIVE TESTS:—

a. 270 grains, rendered alkaline by solution of soda,	require	1000 grain-measures of *Vol. solution of Nitrate of Silver*, before a permanent precipitate forms

b. 100 grains (or 110 minims), precipitated with a solution of nitrate of silver, and the precipitate thoroughly washed and dried, yield 10 grains of cyanide of silver.

PHARMACY.—1. *Officinal Preparation.*

Vapor Acidi Hydrocyanici	Diluted hydrocyanic acid, ♏ 10 to 15; Cold water, fl ʒ i.

2. Diluted hydrocyanic acid is an ingredient in Tinctura Chloroformi et Morphinæ.

3. *Incompatibles.*—Sulphurets; salts of silver, copper, and iron; red oxide of mercury.

ACTION.—Externally hydrocyanic acid is a **cutaneous sedative,** and is especially used for this purpose in the form of cyanide of potassium, made into a lotion. Internally it is a valuable **gastric, pulmonary,** and **vascular sedative**; and an **antispasmodic.** Hydrocyanic acid is a powerful poison, acting as a **general depressant.** The vapour is inhaled as a **pulmonary sedative,** to relieve cough and difficulty of breathing.

Dose—♏ 2 to 8.

B. ALCOHOL AMYLICUM—AMYLIC ALCOHOL.

This form of alcohol, commonly known as *fousel oil*, is recognised in the B.P. as a distinct preparation, which consists of amylic alcohol, $C_5H_{11}HO$, with a small proportion of other spirituous substances.

Source and Preparation.—A liquid of oily consistence, contained in the crude spirit produced by the fermentation of saccharine solutions with yeast, and separated in the rectification or distillation of such crude spirit. It should be distilled, and the product passing over at 253° to 260° be alone collected for use.

Characters and Properties:—

a. Amylic alcohol is a colourless liquid.

b. It has a penetrating and oppressive odour; and a burning taste.

c. When pure its sp. gr. is 0·818.

d. It is sparingly soluble in water, but soluble in all proportions in alcohol, ether, and essential oils.

e. Exposed to the air in contact with platinum-black, amylic alcohol is slowly oxidised, yielding valerianic acid.

Pharmacy.—Amylic alcohol is introduced into the B.P. for the purpose of making Amyl Nitris and Sodii Valerianas.

C. Ethylic Alcohol Group.

General Summary.—The forms and preparations in which ethylic alcohol is recognised in the B.P., may be thus arranged:—

1. **Alcohol Ethylicum—Ethylic Alcohol—Absolute Alcohol**=C_2H_5HO, with 1, or at most 2 per cent. of water.

2. **Spiritus Rectificatus—Rectified Spirit.**—Alcohol with 16 per cent. of water.

3. **Spiritus Tenuior—Proof Spirit.**—Diluted rectified spirit, containing about 49 per cent. by weight, about 57 per cent. by volume, of alcohol.

4. **Spiritus Vini Gallici—French Brandy.**—Contains about 55 per cent. of alcohol by measure, with volatile oil and œnanthic ether.

a. Mistura Spiritus Vini Gallici.

5. **Vinum Xericum—Sherry Wine.**—Contains 17 to 18 per cent. of alcohol, œnanthic ether, cream of tartar, malates, sugar, etc.

6. **Vinum Aurantii—Orange Wine.**—Contains 10 to 12 per cent. of alcohol.

Source and Preparation.—This part of the subject may be very briefly discussed.

1. *Absolute alcohol.*—This is made by first macerating **rectified spirit,** O 1, with **carbonate of potassium,** ℥ 2, for 24 hours, with frequent agitation; then with small fragments of recently fused and cooled **chloride of calcium** for the same time in a flask; and finally distilling. A dry condenser is closely connected with a receiver, from which the access of air is excluded. The first fl ℥ 2 distilled should be returned to the flask, and then the distillation continued until fl ℥ 15 have been recovered.

2. *Rectified spirit.*—Obtained by the distillation of fermented saccharine fluids, in which the *Torula cerevisiæ* is present, at a temperature between 60° and 80°. The sugar is decomposed into alcohol and carbonic acid—$C_6H_{12}O_6 = 2CO_2 + 2C_2H_6O$.

The product is rectified, until it is of the proper density.

3. *Proof spirit.* Mix { Rectified spirit, 5 / Water, 3.

4. *Brandy.*—Spirit distilled from French wine.

5. *Sherry wine.*— A Spanish wine.

6. *Orange wine.*—Wine made in Britain, by the fermentation of a saccharine solution, to which the fresh peel of the bitter orange has been added.

Characters and Properties.—It is only necessary to allude here to the purely alcoholic group, (excluding brandy and wines), and their characters and properties may be readily summed up thus:—

a. They are colourless and very mobile liquids.

b. They have a characteristic pleasant odour; and a more or less strong spirituous burning taste. A little rectified spirit rubbed on the back of the hand leaves no unpleasant smell after the spirit has evaporated.

c. They tend to evaporate; are entirely volatilised with heat; and are inflammable, burning with a blue flame without smoke.

d. Sp. gr. { Ethylic alcohol, 0·797 to 0·800
Rectified spirit, 0·838
Proof spirit, 0·920.

e. The several liquids remain clear when diluted with distilled water.

f. Rectified spirit mixes in all proportions with water, ether, acetic ether, and amyl nitrite.

g. Rectified spirit dissolves ammonia, potash (not the carbonate), soda, and lithia; iodine and bromine; sulphur; phosphorus; many alkaline and metallic salts, especially those that are deliquescent; castor oil; camphor and volatile oils; balsams; tannic and gallic acids; sugar and mannite; several vegetable alkaloids; and colouring matters.

Tests.—In the B.P. special tests are applied to ethylic alcohol and rectified spirit.

1. *Alcohol* does not cause anhydrous sulphate of copper to assume a decided blue colour, even after the two have been well shaken together. (This shows absence of water).

2. *Rectified spirit.*—fl ʒ 4 with 30 grain-measures of *Vol. solution of nitrate of silver*, exposed for 24 hours to bright light, and then decanted from the

black powder which has formed, undergoes no further change when again exposed to light with more of the test. (This indicates that amylic alcohol and aldehyde are not present in excess).

PHARMACY.—1. *Officinal Preparation.*

Mistura Spiritus Vini Gallici.

Rub together { The yolk of two eggs / Refined sugar, ℥ ½ } ;

and add { Cinnamon water, / French brandy, } of each fl ℥ 4.

2. The members of the alcoholic group are pharmaceutically employed in making several important preparations in the B.P., as follows :—

a. Ethylic alcohol is used in making Liquor Sodii Ethylatis.

b. Rectified spirit is used in preparing, or is a constituent of :—

(i) Several Tinctures.
(ii) Almost all the officinal Spirits, and the Essences.
(iii) Most of the alkaloids, and santonine.
(iv) Solutions of several alkaloids.

c. Proof spirit is used in preparing :—

(i) Most Tinctures.
(ii) Spiritus Armoraciæ Compositus.

d. Sherry wine is the basis of all the officinal Wines, except :—

e. Orange-wine, contained in { Vinum Ferri Citratis, / Vinum Quininæ.

ACTION.—Alcohol is an **antiseptic,** but is not definitely used for this purpose therapeutically. Externally, in the form of spirit of wine, it is **refrigerant,** if evaporation is allowed ; **stimulant** or **rubefacient,** if evaporation is prevented. Some of the spirits in ordinary use, such as gin or whisky, are often employed in a diluted form, as cooling applications. Internally, alcohol in various

forms and doses may act as a **gastric stimulant;** a **diffusible stimulant,** especially affecting the nerve-centres and heart; a **depressant** and **narcotic** in full doses; **diaphoretic; diuretic;** or **antipyretic.**

Dose—Of Mistura Spiritus Vini Gallici, fl ʒ 1 to 2.

D. ÆTHER GROUP.

GENERAL SUMMARY.—The different forms and preparations of Ether recognised in the B.P. include:—

1. **Æther—Ether—Sulphuric Ether.**—A volatile liquid prepared from alcohol, and containing not less than 92 per cent. by volume of pure ether ($C_4H_{10}O$).

2. **Æther Purus—Pure Ether.**—Ether free from alcohol and water.

3. **Spiritus Ætheris—Spirit of Ether.**—A mixture of ether and rectified spirit = 1 to 2.

4. **Spiritus Ætheris Compositus—Compound Spirit of Ether—Hoffmann's Anodyne.**—A mixture of ethereal oil with spirit of ether.

5. **Spiritus Ætheris Nitrosi—Spirit of Nitrous Ether—Sweet Spirit of Nitre.**—A spirituous solution containing nitrous compounds, aldehyd, and other substances.

6. **Æther Aceticus—Acetic Ether—Acetate of Ethyl** = $C_2H_5C_2H_3O_2$.

SOURCE AND PREPARATION:—

1. *Æther.*—This compound is obtained from rectified spirit, by a somewhat complicated process

—*the continuous etherification process*, of which the following are the essential parts:—

a. Mix in a glass flask { **Sulphuric acid,** fl ʒ 10 / **Rectified spirit,** fl ʒ 12 } ; and distil at a temperature sufficient to maintain the liquid in brisk ebullition.

b. As soon as the ethereal fluid begins to pass over, supply fresh spirit by means of a specially-arranged tube in a continuous stream, and in such quantity as to equal the volume of the fluid which distils over. When the remainder of fl ʒ 50 of spirit has been added, and fl ʒ 42 have distilled over, the process may be stopped.

c. Agitate the impure ether in a bottle with { **Chloride of calcium,** ʒ 10 / **Slaked lime,** ʒ ½ / **Distilled water,** fl ʒ 13.

d. Leave the mixture at rest for 10 minutes, pour off the supernatant fluid, and distil until the distillate reaches sp. gr. 0·735.

In this process *sulphovinic acid* is first formed, thus:—$H_2SO_4 + C_2H_6O = C_2H_6SO_4 + H_2O$.

The sulphovinic acid is again decomposed by the alcohol, ether and sulphuric acid being formed:—

$$C_2H_6SO_4 + C_2H_6O = H_2SO_4 + C_4H_{10}O.$$

The ether is then purified from sulphurous and sulphuric acids, and water.

2. *Æther Purus.*—Prepared from ether, thus:—

a. Shake **ether,** O 2, with **distilled water,** O 1, in a bottle, to remove the rectified spirit.

b. When the liquids have separated, decant off the supernatant ether. Mix this with **distilled water,** O 1, and again, after separation, decant.

c. Digest the washed ether for 24 hours with recently burnt **lime,** ʒ 1, and **chloride of calcium,** ʒ 14, in a retort, to remove the water. Distil into a closely-attached receiver.

3. *Spiritus Ætheris.*—Mix { **Ether,** 1 / **Rectified spirit,** 2.

4. *Spiritus Ætheris Compositus.*

a. Gradually mix { **Sulphuric acid,** fl ℥ 36 / **Rectified spirit,** fl ℥ 40 }; and let the mixture stand for 24 hours.

b. Distil until the fluid in the retort begins to blacken. Shake the distillate with lime-water to neutralize any acid; remove the supernatant liquid, and expose it to the air for about 12 hours.

c. Pour fl ʒ 3 of the liquid into { **Ether,** fl ℥ 8 / **Rectified spirit,** fl ℥ 16.

5. *Spiritus Ætheris Nitrosi.*—Made from rectified spirit, by the following method:—

a. Add gradually { **Sulphuric acid,** fl ℥ 2, to / **Rectified spirit,** O 1 }; and then add gradually **Nitric acid,** fl ℥ 2½.

b. Distil in a retort or flask with fine **copper wire,** ℥ 2, between 170° and 180°, until fl ℥ 12 have passed over into a bottle, it and the condenser being kept cool with ice-cold water.

c. Allow the contents of the retort to cool; again add **nitric acid,** fl ℥ 1½; and distil until the distillate has increased to fl ℥ 14.

d. Mix with **rectified spirit,** O 2, or as much as will make the product correspond to a special test. (*See* B.P., p. 378).

6. *Æther Aceticus.*—Made in the following way:—

a. Slowly add { **Sulphuric acid,** fl ℥ 32½, to / **Rectified spirit,** fl ℥ 32½ }; keeping the fluid cool; then add **acetate of sodium,** ℥ 40, mixing thoroughly.

b. Distil fl ℥ 45.

c. Digest the distillate with freshly dried **carbonate of potassium,** ℥ 6, for 3 days. Separate the ethereal fluid, and again distil until all but about fl ℥ 4 have passed over. Preserve in a well-closed bottle, in a cool place.

In this process *ether* is formed; *acetic acid* is liberated from the acetate of sodium; they combine, acetic ether distilling over, with some water, which is afterwards removed.

$$H_2SO_4 + C_2H_6O = C_2H_6SO_4 + H_2O$$
$$C_2H_6SO_4 + NaC_2H_3O_2 = C_2H_5C_2H_3O_2 + NaHSO_4.$$

Characters and Properties. — The characters and properties of the several ethereal preparations may be readily grouped in the following way:—

1. They are colourless mobile liquids. Spirit of nitrous ether may have a faint yellow tinge.

2. They are volatile, especially ether and pure ether, with the production of considerable cold; they leave no residue on evaporation; and are inflammable.

3. The different forms of ether have each a peculiar and characteristic odour and taste:—

	Odour.	Taste.
Ether	Strong and sweet; fragrant.	Hot and pungent.
Nitrous Ether .	Agreeable and penetrating; apple-like.	Sweetish; cooling and sharp.
Acetic Ether . .	Agreeable: ethereal; faintly like apples.	Burning.

4. Their respective Sp. gr. are as follows:—

Æther	=0·735
Æther Purus	=0·720
Spiritus Ætheris	=0·809
Spiritus Ætheris Nitrosi	=0·840 to 0·845
Æther Aceticus	about=0·900

5. Nitrous ether has a slight acid reaction usually, but does not effervesce, or only feebly, when shaken with a little bicarbonate of sodium. The other forms should be neutral.

6. Fifty measures of ether agitated with an equal volume of water are reduced to 45, by an absorption of 10 per cent. Acetic ether is soluble in water (about 1 in 10). Spirit of ether readily mixes with water. Ether is soluble in all proportions in rectified spirit; and acetic ether in both rectified spirit and ether.

7. Ether dissolves iodine, bromine, and corrosive sublimate freely; sulphur and phosphorus sparingly; volatile and fixed oils; many resins and balsams; caoutchouc; and most of the vegetable alkaloids. It does not dissolve the caustic alkalies.

Special and Quantitative Tests.

1. *Pure Ether.*—When shaken with one-fourth of its bulk of solution of iodide of potassium and a little starch paste, no blue colour is produced.

2. *Spirit of Nitrous Ether.*

a. When agitated in a test tube with a strong solution of sulphate of iron, if a few drops of strong sulphuric acid are poured down the side of the tube, a deep olive-brown or black zone is produced, widening as the tube is gently shaken.

b. Tested in a special way, (as described in *Pharmaceutical Journal*), it should yield, at the ordinary temperature and pressure, and when

freshly-prepared, seven times its volume of nitric oxide gas; and even after it has been kept some time, and the vessel containing it has occasionally been opened, it should yield not much less than five times its volume of the gas.

PHARMACY.—1. *Ether* is contained in Collodion; Collodion Flexile; and Tinctura Chloroformi et Morphinæ. It is also used in making Extractum Filicis Liquidum, Extractum Mezerei Æthereum, and Extractum Stramonii.

2. *Spirit of Ether* is contained in Tinctura Lobeliæ Ætherea.

3. *Acetic Ether* is used in making Liquor Epispasticus.

4. *Incompatibles.*—Spirit of Nitrous Ether is incompatible with iodide of potassium; sulphate of iron; tincture of guaiacum; gallic and tannic acids; and emulsions.

ACTION.—Ether, administered by inhalation, is a **general anæsthetic,** pure ether being specially and extensively employed during operations for this purpose. Externally, it may be used as a **refrigerant, local anæsthetic, stimulant,** or **rubefacient,** according to the mode of application. Internally this remedy is usually given in the form of spirit of ether or compound spirit of ether, and it may act under different circumstances as a powerful **diffusible stimulant, antispasmodic, narcotic,** or **stimulant expectorant.** As a diffusible stimulant ether is also injected subcutaneously in urgent cases. Acetic ether has similar actions, but is less powerful. Spirit of nitrous ether is a **stimulant,** but is chiefly employed as a **diaphoretic,** or **diuretic.** It is a common ingredient in "saline mixtures," being a useful **febrifuge.**

Doses—Of Ether, ♏ 20 to 60.
Spirit of Ether, ♏ 30 to 90.
Compound Spirit of Ether, ♏ 30 to fl ʒ 2.
Acetic Ether, ♏ 20 to 60.
Spirit of Nitrous Ether, fl ʒ ½ to 2.

E. Chloroformum — Chloroform — Terchloride of Formyl = $CHCl_3$.

Source and Preparation.—Chloroform is prepared from chlorinated lime and rectified spirit, by an elaborate process, of which the following are the essential parts:—

1. Distil, at first with heat { **Chlorinated lime,** ℔ 10 **Slaked lime,** ℔ 5 **Rectified spirit,** fl ʒ 30 **Water,** C 3.

2. When the distillate reaches fl ʒ 50 mix it well with water by shaking, and allow the mixture to separate into two strata. Remove the lower stratum = crude chloroform; wash it repeatedly with distilled water; and agitate it for 5 minutes with an equal volume of pure **sulphuric acid.**

3. Separate the chloroform; and agitate it with { **Chloride of calcium,** ʒ 2 **Slaked lime,** ʒ ½.

4. Decant the chloroform; and re-distil by means of a water-bath. Add 1 per cent. by weight of ethylic alcohol.

Characters and Properties :—

1. Chloroform is a colourless, limpid liquid.
2. It has an agreeable ethereal odour; and a sweet taste.
3. It is neutral in reaction.
4. Sp. gr. 1·497.
5. Chloroform is volatile; it evaporates speedily, and leaves no residue and no unpleasant odour.
6. It burns, though not readily, with a green smoky flame.
7. It is soluble in water (1 in 200); in alcohol and ether in all proportions.
8. Chloroform dissolves most resins and fats; fixed and volatile oils; most organic alkaloids; iodine and bromine; caoutchouc and gutta percha; benzoin; wax partially; sulphur and phosphorus sparingly.

Test.—After agitation with sulphuric acid, the latter is not coloured to any greater extent than that producible by absolute chloroform to which 1 per cent. of ethylic alcohol has been added.

Pharmacy.—*Officinal Preparations :—*

a. Aqua Chloroformi.

Dissolve by shaking in a two-pint stoppered bottle { Chloroform, ʒ 1 / Distilled water, fl ʒ 25.

b. Linimentum Chloroformi.

Mix { Chloroform, 1 / Liniment of camphor, 1.

c. Spiritus Chloroformi. Sp. gr. 0·871.

Mix { Chloroform, 1 / Rectified spirit, 19.

d. Tinctura Chloroformi Composita.

Mix { Chloroform, 2 / Rectified spirit, 8 / Compound tincture of cardamoms, 10.

e. Tinctura Chloroformi et Morphinæ.

Dissolve { Hydrochlorate of morphine, gr. 8
Oil of peppermint, ♏ 4
Rectified spirit, fl ℥ 1,

Add { Chloroform, fl ℥ 1
Ether, fl ʒ 2.

Mix { Liquid extract of liquorice, fl ℥ 1
Treacle, fl ℥ 1
Syrup, fl ℥ 3 } ;

add this to the previously formed solution; mix thoroughly; add diluted hydrocyanic acid, fl ℥ ½; and make up with syrup to fl ℥ 8.

Action.—Externally, chloroform may be employed as a **cutaneous stimulant** or **rubefacient,** especially in the form of liniment; and when mixed with certain other drugs, it aids their absorption by the skin. This agent is chiefly used, inhaled in the form of vapour, as a **general anæsthetic;** in small quantity, either alone or with steam, it may also be administered in this manner as a **pulmonary sedative.** Internally, chloroform is chiefly used for its flavour, especially as chloroform water, or as a **gastric sedative, pulmonary sedative,** or **antispasmodic;** in large doses it becomes a **narcotic.**

Doses—Of Chloroform, ♏ 3 to 10.
Chloroform Water, fl ℥ ½ to 2.
Spirit of Chloroform, ♏ 20 to 60.
Compound Tincture of Chloroform, ♏ 20 to 60.
Tincture of Chloroform and Morphine, ♏ 5 to 10.

F. Iodoformum—Iodoform. CHI_3.

Source and Preparation.—The B.P. merely states with regard to iodoform, that it is "A product of the action of **iodine** on a mixture of **alcohol** and solution of **carbonate of potassium.**"

Characters and Tests:—

1. Iodoform is in shining, lemon-yellow, crystalline scales; somewhat greasy to the touch.
2. It has a persistent and disagreeable odour and flavour.
3. It is very slightly soluble in cold water, more soluble in rectified spirit, soluble in chloroform or ether, readily and entirely soluble in warm ether.
4. The solutions are neutral to test-paper.
5. When heated, iodoform first melts to a brown liquid, then gives off brown and violet vapours, leaving a black residue which entirely disappears on continued ignition.
6. Warmed with an alcoholic solution of potash, and the resulting fluid acidified by nitric acid, iodine is liberated.

Pharmacy.—*Officinal Preparations:*—

a. Suppositoria Iodoformi.—Made with oil of theobroma, each suppository containing gr. 3 of iodoform.

b. Unguentum Iodoformi.

Melt and mix { Iodoform, 1; Benzoated lard, 9.

Action.—Iodoform is much employed externally as an **antiseptic.** It is also administered internally, on the supposition that it produces a similar effect; and has been specially recommended in phthisis.

Dose—gr. $\frac{1}{2}$ to 3.

G. Chloral Hydras — Hydrate of Chloral = C_2HCl_3O, H_2O.

Source and Preparation.—Chloral produced by the action of dry **chlorine gas** on **anhydrous alcohol,** purified by treatment, first with **sulphuric acid** (to remove water and alcohol), and afterwards with a small quantity of **lime** (to take up hydrochloric acid that is formed), and finally converted into hydrous chloral by the addition of **water.**

Characters and Tests :—

1. Hydrate of chloral is in small colourless crystals, which do not deliquesce on exposure to air.

2. They have a peculiar, pungent, but not acrid odour ; and a pungent and rather bitter taste.

3. Hydrate of chloral is soluble in less than its own weight of water, rectified spirit, or ether ; and in four times its weight of chloroform.

4. The aqueous solution is neutral or but slightly acid to test-paper (absence of HCl).

5. Chloral hydrate melts with gentle heat to a colourless transparent liquid, which begins to solidify at about 120° ; it boils in a test-tube, with pieces of broken glass, at from 202° to 206°, volatilizes at a slightly higher temperature on platinum foil, without residue.

6. It is decomposed by alkalies into chloroform and an alkaline formiate.

7. A solution in chloroform, agitated with sulphuric acid, does not impart colour to the acid (absence of oily impurities).

QUANTITATIVE TEST.—100 grains dissolved in fl ℥ 1 of distilled water, and mixed with 30 grains of slaked lime, should yield not less than 70 grains of chloroform on careful distillation.

PHARMACY.—*Officinal Preparation :—*

Syrupus Chloral = gr. 10 in fl ʒ 1.

Dissolve { Hydrate of chloral, gr. 80 / Distilled water, fl ʒ 1½ } ; and add Syrup, to make up fl ℥ 1.

ACTION.—Externally hydrate of chloral is used in solution as an **antiseptic.** Internally it acts as a **cerebral sedative** and **hypnotic, spinal sedative,** and **antispasmodic.** It may also be employed as a **pulmonary** or **cardiac sedative** under certain circumstances; and in large doses becomes a dangerous **cardiac** and **pulmonary depressant.**

Dose—Of Hydrate of Chloral, gr. 5 to 30; Syrup, fl ʒ ½ to 2.

H. BUTYL-CHLORAL HYDRAS—HYDRATE OF BUTYL-CHLORAL = $C_4H_5Cl_3O, H_2O$.

SOURCE AND PREPARATION.—Butyl-chloral, produced by the action of dry **chlorine** gas on **aldehyd** cooled to a temperature of 14°, separated by fractional distillation, and converted into the solid hydrous butyl-chloral by the addition of water.

CHARACTERS AND TESTS :—

1. Butyl-chloral hydrate is in pearly white crystalline scales.

2. It has a pungent but not acid odour, resembling that of hydrous chloral; and an acrid nauseous taste.

3. It is soluble in about 50 parts of water, in its own weight of glycerine and of rectified spirit, and nearly insoluble in chloroform.

4. The aqueous solution is neutral or but slightly acid to test-paper.

5. Butyl-chloral hydrate fuses at about 172° to a transparent liquid, which in cooling, commences to solidify at about 160°.

6. It does not yield chloroform when heated with solutions of potash or soda, or with milk of lime.

Action.—Butyl-chloral is **hypnotic**; and has also a peculiar **anodyne** action upon the fifth nerve, thus relieving neuralgia of the temples and face.

Dose—Gr. 5 to 15.

I. Amyl Nitris—Nitrite of Amyl = $C_5H_{11}NO_2$.

Source and Preparation.—A liquid produced by the action of **nitric** or **nitrous acid** on **amylic alcohol**, which volatilizes between 262° and 270°. It should be stored in hermetically-sealed vessels or in well-stoppered bottles, and in a cool dark place.

Characters and Properties:—

1. Nitrite of amyl is an ethereal liquid, of yellowish colour.

2. It is very volatile; submitted to distillation about 70 per cent. passes over at 194° to 212°.

3. It has a peculiar, and not disagreeable odour.

4. Sp. gr. about 0·880.

5. Nitrite of amyl is insoluble in water; freely soluble in alcohol, ether, and chloroform.

6. If added drop by drop to fused caustic potash, valerianate of potash is formed.

ACTION.—Nitrite of amyl is chiefly employed by inhalation, and is a **vaso-dilator** and **cardiac stimulant**, increasing considerably the frequency of the heart's action, and diminishing arterial tension; it is especially used in the complaint named angina pectoris. It sometimes acts as a **pulmonary sedative** in asthma; and is also a **spinal depressant.**

Dose—♏ ½ to 1 internally; ♏ 2 to 5 by inhalation. To be used with caution.

TABELLÆ NITRO-GLYCERINI—TABLETS OF NITRO-GLYCERINE.

These may be mentioned here, and they are described in the B.P. as "Tablets of chocolate each weighing two and a half grains, and containing one-hundredth of a grain of pure nitro-glycerine."

ACTION.—Similar to Nitrite of Amyl.

Dose—1 or 2 tablets.

J. ACIDUM CARBOLICUM—CARBOLIC OR PHENIC ACID = HC_6H_5O.

SOURCE AND PREPARATION.—An acid obtained from coal-tar oil, by fractional distillation and subsequent purification.

CHARACTERS AND TESTS.—

1. Carbolic acid occurs in separate pulverulent crystals, or in acicular crystalline masses.

2. They are colourless, or have a very slight reddish or brownish tint.

3. Carbolic acid has a peculiar and powerful odour and taste.

4. The boiling point is not higher than 371°, and the melting point not lower than 91·5°.

5. Sp. gr. at the melting point, 1060 to 1066.

6. At 60°, 100 parts of the acid are liquefied by the addition of 5 to 10 parts of water; dissolve 30 to 40 of water; and are dissolved by 1800 to 1200 of water, the former and latter of these numbers being respectively characteristic of the acicular and pulverulent varieties of the acid. The aqueous solution should be clear and colourless, or nearly so.

7. Carbolic acid is freely soluble in alcohol, ether, benzol, chloroform, disulphide of carbon, glycerine or glycerine and water, and in solution of alkalies.

8. It does not redden blue litmus paper.

9. It coagulates albumen and collodion.

10. It does not affect the plane of polarization of a ray of polarised light.

11. Neutral solution of perchloride of iron strikes a deep purple colour, and bromine water gives a white precipitate with a cold saturated aqueous solution of carbolic acid. Solution of ammonia and of chlorinated soda produce a deep purple coloration, especially after a time.

Impurities.—Cresol is present in the ordinary carbolic acid, which causes it to change colour, and modifies its boiling-point.

Pharmacy.—1. *Officinal Preparations.*

a. Acidum Carbolicum Liquefactum—Liquefied Carbolic Acid.—Carbolic acid liquefied by the addition of 10 per cent. of water.

Characters. — This is a colourless or very slightly reddish or brownish liquid, with the odour and taste of carbolic acid. Sp. gr. 1·064 to 1·067 at 60°. It dissolves 18 to 26 per cent. of water

at 60°, yielding a clear or nearly clear solution, from which any slight coloured impurity separates as dark oily drops.

b. Glycerinum Acidi Carbolici.

Rub together until dissolved { Carbolic acid, 1 / Glycerine, 4.

c. Suppositoria Acidi Carbolici cum Sapone.

Made with curd soap and glycerine of starch, each suppository containing gr. 1 of carbolic acid.

d. Unguentum Acidi Carbolici.

Melt and stir together until cold { Carbolic acid, 1 / Soft Paraffin, 12 / Hard Paraffin, 6.

2. Carbolic acid is used in making the Sulphocarbolates of Sodium and Zinc.

ACTION.—1. Carbolic acid is much used as a **disinfectant** for general purposes.

2. As a local application it may act, according to its strength, as **caustic, irritant, stimulant,** or **cutaneous sedative,** but is chiefly and extensively employed as an **antiseptic** or **disinfectant.** It may also be used as a **parasiticide.** In the form of inhalation it is much employed for antiseptic purposes in affections of the throat and respiratory organs.

3. Internally carbolic acid in small doses, or in the form of sulphocarbolate, acts as an **antizymotic** in the stomach, checking fermentative processes; and is also used as an immediate and remote **antiseptic.** In large doses it becomes a powerful irritant poison, and produces other grave results, which may also arise from absorption of the acid when applied for antiseptic purposes.

Dose—Of Carbolic Acid, gr. 1 to 3; Liquefied Acid, ♏1 to 4.

K. Creasotum—Creasote.

Source and Preparation.—A product of the distillation of wood-tar.

Characters and Tests.—1. Creasote is a liquid, colourless or with a yellowish tinge.

2. It has a strong empyreumatic odour; and a burning taste.

3. Sp. gr. = 1·071.

4. Creasote is sparingly dissolved by water, but freely by alcohol, ether, and glacial acetic acid. It is insoluble in glycerine.

5. It does not coagulate albumen, and is miscible with collodion without production of any precipitate.

6. Dropped on white filtering paper and heated to 212°, it leaves no translucent stain.

7. It turns the plane of polarization of a ray of polarized light to the right.

8. An aqueous solution (1 per cent.) with a drop of a dilute neutral solution of ferric chloride, yields a green coloration, rapidly changing to a reddish-brown, and, unless the mixture is very dilute, giving a reddish-brown precipitate.

Pharmacy.—1. *Officinal Preparations:*—

a. Mistura Creasoti.

Mix { Creasote, ♏15 / Glacial acetic acid, ♏15 }; gradually add distilled water, fl ℥ 15; and { Syrup, fl ℥ 1 / Spirit of juniper, fl ʒ ½.

b. Unguentum Creasoti.

Mix { Creasote, 1 / Simple ointment, 8.

c. Vapor Creasoti.

Mix { Creasote, ♏12
Boiling water, fl ʒ 8.

2. *Incompatible.*—Oxide of silver.

Action.—The actions of creasote are very similar to those of carbolic acid, but this drug is more especially an **antiseptic** and **antizymotic.** It is chiefly used as an application to carious teeth; as an inhalation in pulmonary diseases; and to check vomiting or diarrhœa in certain conditions, probably mainly by its effects in preventing fermentation in the alimentary canal.

Dose—Of Creasote, ♏1 to 3; Mixture, fl ʒ 1 to 2.

L. { Paraffinum Durum—Hard Paraffin.
{ Paraffinum Molle—Soft Paraffin.

These two forms of paraffin are now officinal, and they may be considered together.

Source and Preparation:—

1. *Hard paraffin* is a mixture of several of the harder members of the paraffin series of hydrocarbons; usually obtained by distillation from shale, separation of the liquid oils by refrigeration, and purification of the solid product.

2. *Soft paraffin* is a semi-solid mixture containing some of the softer or more fluid members of the paraffin series of hydro-carbons; usually obtained by purifying the less volatile portions of petroleum. It is known in commerce by various fanciful names.

Characters and Tests.—These may be summed up as follows:—

1. *Appearance.*—Hard paraffin is colourless, semi-transparent, and crystalline; soft paraffin is white or yellowish, translucent, soft, greasy.

2. Both forms are inodorous and tasteless, and the soft variety is free from any unpleasant odour or flavour, even when warmed to 120°.

3. Their reaction is neutral.

4. Sp. gr. { Hard = 0·82 to 0·94
Soft = 0·84 to 0·87.

5. *Melting point.* { Hard = 110° to 145°
Soft = 95° to 105° or higher.

6. Both varieties burn with a bright flame, leaving no residue. The soft paraffin volatilizes without giving acrid vapours.

7. They are insoluble in water, slightly soluble in absolute alcohol, freely soluble in ether, chloroform, benzol, etc.

8. Soft paraffin is not saponified by solutions of alkalies (absence of fats).

Pharmacy.—The paraffins have been introduced into the B.P. as a basis for making ointments, and they enter into the composition of several of these preparations, usually in combination, but in two instances the soft paraffin is used separately.

Action.—The paraffins are valuable **emollients,** as they cannot become rancid or irritant.

Section III.

THE ORGANIC KINGDOM.

This kingdom includes the two divisions of:—1. **Vegetable** or **Botanical.** 2. **Animal.** I propose to treat of these divisions according to the following plan:—

1. To arrange, in a tabular form, the drugs immediately derived from the vegetable kingdom under their several *Natural Orders*, with the view of simply making the student acquainted at the outset with their (*a*) *names*; (*b*) *botanical* and *geographical sources*; (*c*) *nature*, as to the part or parts of the plant used, or any special product obtained from it; (*d*) chief *constituents*, especially the *active principles*. He should make himself tolerably familiar with this outline of the subject, before proceeding further.

2. To discuss the vegetable drugs under Groups, as parts of plants (roots, leaves, flowers, &c.), or particular products (gums, resins, oils, &c.), indicating:—*a*. Their *nature*, *officinal source*, and *natural order*; *b*. Their chief *characters*; *c*. Their *pharmacy*; and *d*. Their *actions* and *doses*.

3. To give a brief account of the drugs derived from the Animal Kingdom.

TABLE OF NATURAL ORDERS.

I. EXOGENÆ.

A. THALAMIFLORÆ.

Nat. Ord. RANUNCULACEÆ.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Aconitum Napellus. **Monkshood.** *Indigenous.* Cultivated in Britain. Root also imported from Germany.	1. *Aconiti Folia.* The fresh leaves and flowering tops, gathered in July, when about one-third of the flowers are expanded. 2. *Aconiti Radix.* The dried root, collected in winter and early spring. 3. *Aconitina.* The alkaloid derived from the root.	All the recognized parts of the plant contain :— 1. *Aconitina*, the officinal alkaloid. 2. *Aconellin*, *pseudaconitin*, and other alkaloids. 3. *Aconitic acid.*
Podophyllum Peltatum. **American May Apple.** *United States.* Imported from North America.	1. *Podophylli Rhizoma.* The dried rhizome. 2. *Podophylli Resina*—*Resin of Podophyllum.* The resin obtained from the rhizome.	1. *Podophyllin*, the officinal resin. 2. *Berberine*, an alkaloid. 1. *Podophyllotoxin.* 2. *Picropodophyllin.*

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Cimicifuga Racemosa. — **(Actæa Racemosa).** — *United States.*	*Cimicifugæ Rhizoma.* The dried rhizome and rootlets.	1. Volatile oil. 2. Resins. 3. Tannin.
Delphinium Staphisagria. — **Stavesacre.** — *S. Europe.*	*Staphisagriæ Semina.* The dried ripe seeds.	*Delphinine* and other alkaloids.

Nat. Ord. MAGNOLIACEÆ.

Illicium Anisatum. — **Star Anise.** — *China.*	1. *Anisi Stellati Fructus—Star Anise Fruit.* The dried fruit. 2. *Oleum Anisi.* Volatile oil distilled from the fruit.	Volatile oil.

Nat. Ord. MENISPERMACEÆ.

Jateorhiza Calumba. — **Calumba** or **Columbo.** — Forests of *Eastern Africa*, between Ibo and the Zambesi.	*Calumbæ Radix.* The root sliced transversely, and dried.	1. *Calumbine*, a neutral principle. 2. *Calumbic acid.* } Form a yellow salt. 3. *Berberine*, an alkaloid. } 4. Starch. (Does *not* contain tannic or gallic acid).

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Chondodendron Tomentosum. — *Brazil.*	*Pareiræ Radix.* Dried root.	1. *Pelosine* or *Cissampeline*—a base, supposed to be identical with *Berberine.* 2. Resin; bitter yellow matter; starch.

Nat. Ord. PAPAVERACEÆ.

Papaver Somniferum. — **Garden Poppy.** — Grown in Asia Minor. Cultivated in Britain.	1. *Papaveris Capsulæ.* Nearly ripe dried capsules. 2. *Opium.* The juice obtained from incisions made in the unripe capsule, inspissated by spontaneous evaporation. 3. *Morphinæ Acetas.* Acetate of morphine. 4. *Morphinæ Hydrochloras.* Hydrochlorate of morphine. 5. *Morphinæ Sulphas.* Sulphate of morphine. 6. *Codeina.* Codeine. 7. *Apomorphinæ Hydrochloras.* A derivative of morphine and codeine.	The principles contained in opium are very numerous, and only the most important need be mentioned here. 1. *Alkaloids.* *a.* Morphine = at least 6 to 8, or 9 to 12 per cent. in good opium. *b.* Codeine. *c.* Papaverine. *d.* Cryptopine. *e.* Thebaine. *f.* Paramorphine. *g.* Narcotine = 6 to 8 per cent. 2. *Neutral crystalline bodies.* *a.* Meconin. *b.* Narcein. 3. *Acids.* *a.* Meconic = 8 per cent. *b.* Thebolactic. 4. *Other ingredients.* *a.* Extractive matters. *b.* Resin, gum, volatile oil. *c.* Salts.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Papaver Rhœas. — **Red Poppy.** — *Indigenous.*	*Rhœados Petala.* The fresh petals, collected immediately after the expansion of the flower.	1. *Morphine.* (Attfield says there is none). 2. *Rhœadin*, crystallisable non-poisonous alkaloid. 3. *Acids; colouring matter.*

Nat. Ord. CRUCIFERÆ.

Cochlearia Armoracia. — **Horse-Radish.** — *Indigenous.* Cultivated in Britain.	*Armoraciæ Radix.* The fresh root. It may be kept fresh by burying it in sand, in a cool place.	*Volatile oil* is obtained when horse-radish is moistened with water = Sulphocyanide of Butyl, formed by a chemical decomposition.
Brassica Alba et Nigra. — White and Black Mustard. — *Indigenous.*	1. *Sinapis Albæ Semina.* The dried ripe seeds. 2. *Sinapis Nigræ Semina.* The dried ripe seeds. 3. *Sinapis.* The seeds of black and white mustard powdered and mixed. 4. *Oleum Sinapis.* Volatile oil distilled with water from *black* mustard seeds, after the expression of the fixed oil.	1. *Fixed oil* in both = 25 to 35 per cent. 2. *Myrosine* in both = an albuminous ferment. 3. *Myronate of potash* in *black* mustard. 4. *Sinalbin*, a glucoside, in *white* mustard. 5. *Sinapin*, an alkaloid, in both, as a sulphocyanide = sulphosinapisin.

Nat. Ord. POLYGALACEÆ.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Krameria Triandra and **Ixima.** — *Peru and Chili.*	*Krameriæ Radix.* The dried root. Two varieties:— 1. Peruvian. 2. Savanilla.	1. *Kramerie Acid.* 2. *Rhatanin.* 3. *Tannie Acid* = about 40 per cent.
Polygala Senega. — **Senega.** — *North America.*	*Senegæ Radix.* The dried root stock, with branched tap-root.	1. *Senegin* or *Polygalic Acid.* 2. *Tannin.* 3. *Resin.* 4. *Sugar, &c.*

Nat. Ord. LINACEÆ.

Linum Usitatissimum. — **Flax.** — *Indigenous.*	1. *Lini Semina — Linseed.* The dried ripe seeds. 2. *Lini Farina — Linseed Meal.* Linseed reduced to powder. 3. *Oleum Lini—Linseed Oil.* The oil expressed in Britain from linseed without heat.	1. The *fixed oil*, which is officinal = about 20 to 30 per cent. 2. A peculiar *gummy matter* or *mucilage* in the envelope or testa of the seeds, which is readily imparted to hot water.

Nat. Ord. MALVACEÆ.

Gossypium Barbadense, and other species. — *South America and India.*	1. *Gossypium — Cotton wool.* The hairs of the seeds, carded. 2. *Pyroxylin* or *Guncotton* — made from cotton-wool. 3. *Collodium*—made from pyroxylin. 4. *Collodium Flexile* —made from collodion. 5. *Collodium Vesicans* —made from pyroxylin	Cotton is a modification of *lignin.* The other preparations will be subsequently considered.

Nat. Ord. ERYTHROXYLACEÆ.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Erythroxylon Coca. — *Peru.*	1. *Coca.* The dried leaves. 2. *Cocainæ Hydrochloras.* Obtained from the leaves.	The alkaloid, *Cocaine.*

Nat. Ord. STERCULIACEÆ.

Theobroma Cacao. — *West Indies and South America.*	*Oleum Theobromatis* —*Cacao Butter.* A concrete oil, obtained by expression and heat from the ground seeds.	Chiefly *stearin*, with a little *olein.*

Nat. Ord. AURANTIACEÆ.

Citrus Bigaradia. — **Seville and Bitter Orange.** — **Citrus Aurantium.** — **Sweet Orange.** — *South Europe. Spain.*	1. *Aqua Aurantii Floris.* — Water distilled from the flowers of the bitter and sweet orange.	A small quantity of peculiar volatile oil—oil of Neroli.
	2. *Aurantii Cortex* —*Bitter-Orange Peel.* The dried outer part of the rind of *Citrus Bigaradia.*	1. Volatile oil. 2. Bitter extractive —Hesperidin or Aurantiin. 3. A little gallic acid.
	3. *Aurantii Fructus.* The ripe fruit.	

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Citrus Limonum. **Lemon.** The ripe fruit. *South Europe.* Oil of Lemon is chiefly imported from *Sicily*.	1. *Limonis Succus*—*Lemon-juice*. The freshly expressed juice of the ripe fruit. 2. *Limonis Cortex*—*Lemon-peel*. The outer part of the rind of the *fresh* fruit. 3. *Oleum Limonis*—*Oil of Lemon*. The oil expressed or distilled from the fresh peel.	1. Citric acid = 32·5 grains in fl ʒ 1. 2. Malic and phosphoric acids. 3. Mucilage; sugar; salts. 1. Volatile oil. 2. Hesperidin. 3. A littte gallic acid.
Ægle Marmelos. **Bael.** *Malabar and Coromandel.*	*Belæ Fructus*—*Bael fruit*. The half-ripe fruit, dried.	An astringent principle, allied to tannin.

Nat. Ord. CANELLACEÆ.

Canella Alba. **White Canella.** *West Indies.*	*Canellæ Cortex*—*Canella Bark*. The dried bark, deprived of its corky layer.	1. Resin. 2. Volatile oil. 3. Bitter extractive. (Does *not* contain tannic or gallic acid.

Nat. Ord. GUTTIFERÆ.

Garcinia Morella or **Hanburii.** **Gamboge.** *Siam.*	*Cambogia.* — *Gamboge*. A gum-resin obtained from the plant.	1. Yellow, acrid resin—*Gambogic Acid* = 75 to 80 per cent. 2. Soluble gum = from 20 to 25 per cent.

Nat. Ord. VITACEÆ.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Vitis Vinifera. — **Grape-Vine.** — *Spain.*	1. *Uvæ — Raisins.* The ripe fruit, dried in the sun or with artificial heat.	1. Grape-sugar. 2. Acid tartrate of potash. 3. Malic acid. 4. Fixed oil, in seeds. 5. Tannic acid, in seeds and skin.

Nat. Ord. ZYGOPHYLLACEÆ.

Guaiacum Officinale and **Sanctum.** — *St. Domingo and Jamaica.*	1. *Guaiaci Lignum — Guaiacum Wood — Lignum Vitæ.* The heart-wood.	*Resin* = 26 per cent.
	2. *Guaiaci Resina — Guaiacum Resin.* The resin obtained from the stem by natural exudation, incision, or heat.	1. Guaiacic acid. 2. Guaiaretic acid. 3. Guaiaconic acid.

Nat. Ord. RUTACEÆ.

Barosma Betulina; Crenulata; and **Serratifolia.** — **Bucco** or **Buchu.** — *Cape of Good Hope.*	1. *Buchu Folia — Buchu Leaves.* The dried leaves.	1. Volatile oil = about 1½ per cent. 2. Bitter extractive = *Barosmin* or *Diosmin.*

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Pilocarpus Pennatifolius. —— *S. America.*	1. *Jaborandi.* The dried leaflets. 2. *Pilocarpinæ Nitras.* The nitrate of an alkaloid obtained from the extract.	The alkaloid *pilocarpine.*
Galipea Cusparia. —— **Angustura Bark Tree.** —— *Tropical South America.*	*Cuspariæ Cortex*—*Cusparia* or *Angustura bark.* The dried bark.	1. Resin. 2. Neutral bitter principle = *Cusparin* or *Angusturin.* 3. Trace of volatile oil.
Ruta Graveolens. —— **Rue.** —— *South of Europe.*	*Oleum Rutæ*—*Oil of Rue.* The volatile oil distilled with water from the fresh herb.	

Nat. Ord. SIMARUBACEÆ.

Picræna Excelsa. —— **Quassia.** —— *Jamaica.*	*Quassiæ Lignum*—*Quassia Wood.* The wood in shavings, raspings, or chips.	1. Neutral crystallisable bitter principle, = *Quassine.* 2. Some starch. (Does *not* contain tannin.

B. Calicyflorae.

Nat. Ord. RHAMNACEÆ.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Rhamnus Frangula. — Imported from Holland.	*Rhamni Frangulæ Cortex — Frangula Bark.* The dried bark.	*Frangulin*, a glucoside.
Rhamnus Purshianus. — **Cascara Sagrada.** — *S. America.*	*Rhamni Purshiani. Cortex—Sacred Bark.* The dried bark.	1. Crystalline neutral principle. 2. Resinoid bodies.

Nat. Ord. ANACARDIACEÆ.

Pistacia Lentiscus. — *Levant. Island of Scio.*	1. *Mastiche — Mastic.* A resinous exudation obtained by incision from the stem.	1. Mastichic acid. 2. Masticin. 3. A little volatile oil.

Nat. Ord. AMYRIDACEÆ.

Canarium Commune. — *Manilla.*	1. *Elemi.* A concrete resinous exudation.	1. A crystalline resin, *Elemin* = 25 per cent. 2. Uncrystallisable resin = 60 per cent. 3. Volatile oil = 10 to 12 per cent. 4. Crystalline, bitter, neutral principle = 1 to 2 per cent.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Balsamodendron Myrrha. — *Arabia and Abyssinia.*	1. *Myrrha—Myrrh.* A gum-resinous exudation from the stem.	1. Gum, like arabin. 2. Resin = *Myrrhin.* 3. Volatile oil = *Myrrhol.* 4. Salts.

Nat. Ord. LEGUMINOSÆ.

a. PAPILIONACEÆ.

Glycyrrhiza Glabra. — **Liquorice.** — *Indigenous.*	*Glycyrrhizæ Radix—Liquoriee root.* The root and subterranean stems or stolons, fresh and dried.	1. Liquorice sugar or *Glycyrrhizine.* 2. Asparagine. 3. Gum; mucilage. 4. Acrid resinous oil.
Astragalus Gummifer, and other species. — *Asia Minor.*	*Tragacantha—Tragacanth.* A gummy exudation from the stem.	1. *Arabin* = 53 per cent. 2. *Bassorin* = 33 per cent. 3. Starch.
Cytisus or **Sarothamnus Scoparius.** — **Broom.** — *Indigenous.* — *Europe.*	*Scoparii Cacumina—Broom tops.* The fresh and dried tops.	1. *Scoparin* = a neutral principle. 2. *Spartein*, a volatile liquid alkaloid.
Pterocarpus Santalinus. — **Red Sandal Wood Tree.** — *Ceylon. Coromandel.*	*Pterocarpi Lignum—Red Sandal-wood.* The sliced or rasped heart-wood.	1. *Santalic acid* or *Santalin* = dark-red and crystalline. 2. Santal. 3. Kino-tannic acid in small quantity.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Pterocarpus Marsupium. — **Kino Tree.** — *Malabar.*	*Kino.* — Inspissated juice from incisions in the trunk.	1. *Mimo- Kino-* or *Catechu-tannic acid* = 75 per cent. 2. *Catechin.* 3. *Red gum* = about 24 per cent.
Myroxylon Pereiræ. — *San Salvador, Central America.*	*Balsamum Peruvianum—Balsam of Peru.* A balsam exuding from the trunk of the tree, after the bark has been beaten, scorched, and removed.	1. Neutral volatile oil = *Cinnamate of Benzyl* or *Cinnamein* = 60 to 70 per cent. 2. *Metacinnamein*, a crystallisable solid. 3. *Cinnamic acid* = 6 or 7 per cent. 4. *Styracin* or *Cinnamate of Cinnyl.* 5. Resins, supposed to be produced by the oxidation of the oil; increase with age.
Myroxylon Toluifera. — *Tolu* in *New Granada.*	*Balsamum Tolutanum —Balsam of Tolu.* A balsam exuding from the trunk of the tree, after incisions have been made in the bark.	Similar to balsam of Peru; also contains *Tolene*, a volatile oil.
Physostigma Venenosum. — *Western Africa.*	1. *Physostigmatis Faba—Calabar Bean.* The dried seeds. 2. *Physostigmina.* The alkaloid.	1. *Physostigmine* or *Eserine*, the alkaloid, in the cotelydons. 2. Starch, legumin, mucilage, etc.

b. CÆSALPINEÆ.

Botanical Source of Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Hæmatoxylon Campechianum. — Imported from *Campeachy* in *Central America*, from *Honduras* and *Jamaica.*	*Hæmatoxyli Lignum—Logwood.* The heart-wood, in logs or chips.	1. *Hæmatoxyline*, a crystalline substance = 9 to 12 per cent. 2. Tannic acid. 3. Resin. 4. Colouring matter,
Cassia Lanceolata or **Acutifolia.** — Imported from *Alexandria.* — **Cassia Elongata** or **Angustifolia.** — Cultivated in *Southern India.*	1. *Senna Alexandrina — Alexandrian Senna.* Leaflets carefully freed from the flowers, pods, and leaf stalks, and dried. 2. *Senna Indica — Indian* or *Tinnivelly Senna.* The leaflets, dried.	1. A glucoside = *Cathartine* or *Cathartic acid.* 2. A yellow substance identical with *chrysophanic acid.* 3. A crystalline sugar = *Catharto-mannite.* 4. Traces of volatile oil. 5. Tartrate and oxalate of lime and potash.
Cassia Fistula. — **Pudding-Pipe Tree,** or **Purging Cassia.** — *E. and W. Indies.*	*Cassiæ Pulpa.* The pulp from the pods.	1. Cane-sugar = 60 per cent. 2. Mucilage and pectin. 3. A substance analogous to tannin. 4. A purgative principle.
Tamarindus Indica. — *E. and W. Indies.*	*Tamarindus — Tamarind.* The preserved pulp of the fruit.	1. Malic, citric, and tartaric acids. 2. Cream of tartar. 3. Sugar; gum; &c.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Copaifera Langsdorffii, and other species. **Copaiva Trees.** *W. Indies* and *Tropical America;* chiefly *Valley of the Amazon.*	1. *Copaiba—Copaiva.* An oleo-resin, obtained by incision from the trunk, or boring. 2. *Oleum Copaibæ—Oil of Copaiva.* Oil distilled from copaiba.	1. Resin—*Copaivic acid* = about 52 per cent. 2. Volatile oil = about 40 per cent. 3. Soft brown resinous matter = 1½ to 2 per cent., increasing with age.
Andira Araroba. *Brazil.*	*Chrysarobinum — Chrysarobin.* The medullary matter of the stem and branches; dried and powdered.	Chrysophanic acid, in variable quantity, according to age and condition.

c. MIMOSÆ.

Acacia Senegal, and other species. *E. Africa.* Imported from *Alexandria.*	*Acaciæ Gummi — Gum Acacia.* A gummy exudation from the stem and branches.	1. *Arabic acid* or *Arabin,* combined with lime, magnesia, and potash. 2. Water = about 17 per cent. 3. Various salts, &c.

Nat. Ord. ROSACEÆ.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Prunus Amygdalus or **Amygdalus Communis.** — Var., **Amara**, or **Bitter Almond**; and **Dulcis**, or **Sweet Almond.** — *Amara* chiefly from *Mogadore.* — *Dulcis* imported from *Malaga*, and known as *Jordan Almond.*	1. *Amygdala Amara*—*Bitter Almond.* The ripe seeds. 2. *Amygdala Dulcis*—*Sweet Almond.* The ripe seeds. 3. *Oleum Amygdalæ*—*Oil of Almonds.* The oil obtained by *pressure*, from either sweet or bitter almonds.	1. Oil of Almonds = about 50 per cent. 2. *Emulsine* in both,—an albuminous principle. 3. Sugar, gum, &c. 4. Salts, chiefly phosphates. 5. *Amygdalin* — a crystalline glucoside, in *bitter almonds.* When moistened, amygdalin is acted upon by emulsine, and *volatile oil of bitter almonds* or *hydrate of benzoyl* and *hydrocyanic acid* are formed.
Brayera Anthelmintica. — *Abyssinia.*	*Cusso*—*Kousso.* The dried panicles (chiefly of the female flowers).	1. *Koussine*, a crystallizable principle. 2. Volatile oil. 3. Gum, sugar, &c.
Prunus Lauro-cerasus. — **Cherry Laurel.** — *Indigenous.* Native of *Asia Minor.*	*Lauro-cerasi Folia*—*Cherry Laurel Leaves.* The fresh leaves.	1. Amygdalin. } React as in bitter almonds. 2. Emulsine. } 3. Sugar, fat, &c. 4. A little tannic acid.
Prunus Domestica. — **Plum-tree.** — Imported from *South of France.*	*Prunum* — *Prune.* The dried fruit or drupe.	1. Glucose, about 25 per cent. 2. Malic acid. 3. Gum, pectin, &c. 4. Purgative principle of unknown nature.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Rosa Canina. — **Dog Rose.** — *Indigenous.*	*Rosæ Caninæ Fructus.* The ripe fruit, or hips.	1. Citric and malic acids, and their salts. 2. Tannic acid. 3. Sugar, gum, &c. 4. Trace of volatile oil.
Rosa Centifolia. — **Cabbage Rose.** — *Indigenous.* Cultivated.	*Rosæ Centifoliæ Petala.* The fresh petals, fully expanded.	1. Volatile oil—attar of roses. 2. A laxative principle. 3. Traces of tannic and gallic acids. 4. Resin, sugar, &c.
Rosa Gallica. — **Red Rose.** — *Indigenous.* Cultivated.	*Rosæ Gallicæ Petala.* The unexpanded petals fresh and dried.	1. Red colouring matter. 2. Tannic and gallic acids. 3. A glucoside—*Quercitrin.* 4. Volatile oil and sugar, &c.

Nat. Ord. MYRTACEÆ.

Melaleuca Minor. — **Cajuput** or **Cajeput.** — *Moluccas.* Imported from *Batavia* and *Singapore.*	*Oleum Cajuputi—Oil of Cajuput.* The volatile oil distilled from the leaves.	*Hydrate of Cajuputene.* A colourless oil obtained by distillation = about $\frac{3}{4}$.
Eucalyptus Globulus, and other species. — *Australia.*	*Oleum Eucalypti—Oil of Eucalyptus.* Volatile oil distilled from the fresh leaves.	

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Caryophyllus Aromaticus or **Eugenia Caryophyllata.** — **Clove.** — *E. Indian Islands.*	1. *Caryophyllum — Cloves.* The dried unexpanded flower-bud. 2. *Oleum Caryophylli —Oil of Cloves.* The volatile oil distilled in Britain from cloves.	1. Volatile oil = 18 per cent. 2. Salicylic acid. 3. Resin. 4. Tannin.
Punica Granatum. — **Pomegranate.** — *Mediterranean Coast.*	*Granati Radicis Cortex—Pomegranate root bark.* The dried bark of the root.	1. Punico-tannic acid = 20 per cent. 2. Gallic acid. 3. Mannite. 4. *Punicine.*
Eugenia Pimenta or **Pimenta Officinalis.** — **All-spice-tree.** — *W. Indies.*	1. *Pimenta—Pimento.* The dried unripe full-grown fruit. 2. *Oleum Pimentæ—Oil of Pimento.* Oil distilled in Britain from pimento.	1. Volatile oil. 2. Fixed oil. 3. Resin. 4. Much tannin.

Nat. Ord. CUCURBITACEÆ.

Citrullus Colocynthis. — **Colocynth.** — *India, Levant.* Imported chiefly from *Smyrna, Trieste, France,* and *Spain.*	*Colocynthidis Pulpa —Colocynth pulp.* The dried peeled fruit, freed from the seeds.	1. *Colocynthin.* A crystalline glucoside. 2. *Colocynthitin* — crystalline. 3. Bitter resin. 4. A bitter principle. 5. Salts.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Ecballium Elaterium. — **Squirting Cucumber.** — *Southern Europe.*	1. *Ecballii Fructus*—*Squirting Cucumber fruit.* The fruit, a pepo, very nearly ripe. From plants cultivated in Britain.	
	2. *Elaterium.* A sediment from the juice of the squirting cucumber fruit.	1. *Elaterin, elatin,* or *momordicine*, the active principle, not less than 20 per cent. 2. Green resin.
	3. *Elaterinum* — *Elaterin.* The active principle of elaterium.	

Nat. Ord. UMBELLIFERÆ.

Conium Maculatum. — **Spotted Hemlock.** — *Indigenous.*	1. *Conii Folia* — *Hemlock Leaves.* The fresh leaves and young branches, gathered from wild British plants, when the fruit begins to form.	1. *Conine*, a volatile liquid alkaloid. 2. *Methyl-conine*, an alkaloid. 3. *Conic acid*, combined with conine. 4. *Conhydrine*, a base. 5. Non-poisonous volatile oil, with odour.
	2. *Conii Fructus*—*Hemlock Fruit.* The fruit, gathered when fully developed, but while still green, and carefully dried.	
Anethum Graveolens. — **Dill.** — *Central* and *Southern Europe.* Cultivated in *Britain.*	1. *Anethi Fructus*—*Dill Fruit.* The dried fruit.	Volatile oil.
	2. *Oleum Anethi*—*Oil of Dill.* The volatile oil distilled in Britain from the fruit.	

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Pimpinella Anisum. — **Anise.** — *Europe.*	1. *Anisi Fructus—Anise Fruit.* The dried fruit. 2. *Oleum Anisi—Oil of Anise.* The oil distilled in Europe from the fruit.	Volatile oil.
Carum Carui. — **Caraway.** — *Indigenous. Mid-Europe.* Cultivated in *England* and *Germany.*	1. *Carui Fructus—Caraway Fruit.* The dried fruit. 2. *Oleum Carui—Oil of Caraway.* The volatile oil distilled in Britain from the fruit.	Volatile oil.
Carum Ajowan. — *India.*	*Thymol.* A stearoptene obtained from the volatile oil.	
Coriandrum Sativum. — **Coriander.** — *Indigenous. Europe.*	1. *Coriandri Fructus—Coriander Fruit.* The ripe fruit, dried. 2. *Oleum Coriandri—Oil of Coriander.* The volatile oil distilled in Britain from the fruit.	Volatile oil.
Fœniculum Capillaceum. — **Fennel.** — *Southern Europe.*	*Fœniculi Fructus—Fennel Fruit.* The ripe fruit of cultivated plants, dried.	Volatile oil.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Dorema Ammoniacum. — *Punjaub* and *Persia.*	*Ammoniacum.* — A gum-resinous exudation from the stem, after being punctured by beetles.	1. Resin = about 70 per cent. 2. Gum = about 20 per cent. 3. Volatile oil = about 4 per cent.
Ferula Nurthex and **Scorodosma,** and probably other species. — *Afghanistan* and the *Punjaub.*	*Asafœtida.* A gum-resin, exuding from the incised living root.	1. Resin = 65 per cent. 2. Gum = 25 per cent. 3. Volatile oil, chiefly *Sulphide of Allyl* = about 4 per cent.
Ferula Galbaniflua, and other species. — *India; Levant.*	*Galbanum.* A gum-resin.	1. Resin = about 65 per cent. 2. Gum. 3. Volatile oil = about 3·5 per cent.; does not contain sulphur.
Ferula or **Euryangium Sumbul.** — **Musk Root.** — *Central Asia.*	*Sumbul Radix* — *Sumbul Root.* The dried transverse sections of the root.	1. Balsamic resin = 9 per cent. 2. Volatile oil. 3. Umbelliferone.

C. Corollifloræ.

Nat. Ord. CAPRIFOLIACEÆ.

Sambucus Nigra. — **Elder.** — *Indigenous.*	*Sambuci Flores* — *Elder Flowers.* The fresh flowers.	Volatile oil.

Nat. Ord. RUBIACEÆ or CINCHONACEÆ.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Uncaria Gambier. *Singapore.*	*Catechu.* An extract of the leaves and young shoots.	1. Catechu-tannic acid. 2. Catechin or Catechuic acid. 3. Mucilage. 4. Extractive matter.
Cinchona Calisaya, Officinalis, Lancifolia, and other species. *Bolivia, Ecuador,* etc. (Salts of quinine and cinchonine may also be obtained from some species of *Remigia*).	1. *Cinchona Cortex—Cinchona Bark.* The dried bark. 2. *Cinchonidinæ Sulphas—Sulphate of Cinchonidine.* 3. *Cinchoninæ Sulphas—Sulphate of Cinchonine.* 4. *Quininæ Hydrochloras — Hydrochlorate of Quinine.* 5. *Quininæ Sulphas—Sulphate of Quinine.*	1. *Alkaloids.* *a.* Quinine, chiefly in yellow bark, not less than 2 per cent. *b.* Quinidine. *c.* Cinchonine, chiefly in pale bark. *d.* Cinchonidine. 2. *Acids.* *a.* Quinic. *b.* Cincho-tannic. *c.* Cincho-fulvic. *d.* Quinovic. 3. Tannin. 4. Starch, gum, oil, etc.
Cinchona Succirubra. **Red Cinchona.** *India.*	*Cinchonæ Rubræ Cortex—Red Cinchona Bark.* The dried bark of the stem and branches of cultivated plants.	
Cephaelis Ipecacuanha. **Ipecacuanha.** *Brazil.*	*Ipecacuanha.* The dried root.	1. *Emetine*, a feeble alkaloid, almost entirely in the bark = about 1 per cent. 2. Cephaelic or Ipecacuanhic acid.

Nat. Ord. VALERIANACEÆ.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Valeriana Officinalis. — **Valerian.** — *Indigenous.*	*Valerianæ Rhizoma —Valerian Rhizome.* The rhizome and rootlets collected in autumn and dried; from wild plants, and growing on dry soil preferred, or cultivated in Britain.	1. Volatile oil = ½ to 2 per cent. 2. Yields about 5 per cent. of valerianic acid, when distilled with water. 3. Resin, gum, extractive, &c.

Nat. Ord. COMPOSITÆ.

Anthemis Nobilis. — **Chamomile.** — *Indigenous.*	1. *Anthemidis Flores —Chamomile Flowers.* The dried flower-heads, single and double, from cultivated plants. 2. *Oleum Anthemidis —Oil of Chamomile.* The volatile oil, distilled in Britain from the flowers.	1. Volatile oil. 2. Bitter extractive. 3. Tannin in small quantity.
Arnica Montana. — **Leopard's Bane.** — Mountainous parts of *Central* and *Southern Europe.*	*Arnicæ Rhizoma— Arnica Rhizome.* The rhizome and rootlets, dried.	1. *Arnicin* = a bitter resin. 2. Volatile oil. 3. Trimethylamine.
Lactuca Virosa. — **Wild Lettuce.** — *Indigenous.*	*Lactuca — Lettuce.* The flowering herb of the wild plant.	1. Latucic acid. 2. Lactucin } crystal- 3. Lactucone } line. 4. Bitter extractive. 5. Resin, sugar, &c.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Anacyclus Pyrethrum. —— **Pellitory of Spain.** —— *Morocco; Spain; Levant.*	*Pyrethri Radix — Pellitory Root.* The dried root, in pieces.	1. Resins = *Pyrethrin* or *Pyrethric Acid*; and another. 2. Tannin, gum, &c. 3. Yellow, acrid oil.
Artemisia Maritima. —— *Russia.*	1. *Santonica.* The dried unexpanded flower-heads or capitula. 2. *Santoninum — Santonin.* A crystalline principle.	1. *Santonin* = 1½ to 2 per cent. 2. Volatile oil.
Taraxacum Officinale. —— **Dandelion.** —— *Indigenous.*	*Taraxaci Radix — Dandelion Root.* The fresh and dried roots. Collected in the autumn from indigenous plants.	1. Bitter extractive. 2. *Taraxacin*, a crystalline principle. 3. Resin, &c.

Nat. Ord. LOBELIACEÆ.

Lobelia Inflata. —— **Indian Tobacco.** —— *N. America.*	*Lobelia.* The dried flowering herb.	1. *Lobelic acid*, a volatile oil. 2. *Lobeline*, a volatile liquid alkaloid.

Nat. Ord. ERICACEÆ.

Arctostaphylos Uva Ursi. —— **Bearberry.** —— *Europe. Indigenous.*	*Uvæ Ursi Folia — Bearberry Leaves.* The dried leaves. From indigenous plants.	1. Tannic acid = about 36 per cent. 2. Gallic acid. 3. *Arbutine* } crystalline. 4. *Ursine* }

Nat. Ord. SAPOTACEÆ.

Botanical Source or Name of Plant. Geographical Source.	Offioinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Dichopsis Gutta, and several other trees. *Borneo; Sumatra.*	*Gutta Percha.* The dried concrete juice.	1. *Gutta* = 80 per cent. 2. Resins.

Nat. Ord. STYRACACEÆ.

Styrax Benzoin, and other species. **Benjamin Tree.** *Eastern Archipeligo; Siam; Sumatra.*	1. *Benzoinum—Benzoin.* A balsamic resin, exuding from incisions made in the bark. 2. *Acidum Benzoicum—Benzoic Acid.* The acid obtained from Benzoin by sublimation.	1. *Benzoic acid* = 10 to 20 per cent. 2. *Cinnamic acid.* 3. Resin.

Nat. Ord. TERNSTRÆMIACEÆ.

Camellia Thea. **The Tea Plant.** *China.* **Coffea Arabica.**	1. *Caffeina — Caffcine,* (also called *Theine* and *Guaranine*). An alkaloid obtained from the dried leaves; also from the dried seeds of *Coffea Arabica.* 2. *Caffeinæ Citras—Citrate of Caffeine.*	

Nat. Ord. OLEACEÆ.

Olea Europæa. **Olive.** *S. Europe.*	*Oleum Olivæ—Olive Oil.* The oil expressed in the South of Europe from the ripe fruit.	*Oleine* = 27 per cent.; and *margarine.*

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Fraxinus Ornus. —— *Calabria; Sicily.*	*Manna.* A concrete saccharine exudation from incisions in the stems of cultivated trees.	1. Mannite = 60 to 80 per cent. 2. Small quantity of bitter matter. 3. Extractive and sugar.

Nat. Ord. APOCYNACEÆ.

Gelsemium Nitidum. —— **Yellow Jasmine.** —— *S. America.*	*Gelsemium.* The dried rhizome and rootlets.	1. *Gelsemine*, an alkaloid. 2. *Gelseminic acid.*

Nat. Ord. ASCLEPIADACEÆ.

Hemedesmus Indicus. —— **Indian Sarsaparilla.** —— *India.*	*Hemidesmi Radix* — *Hemidesmus Root.* The dried root.	*Hemidesmic acid.* Volatile and crystallizable.

Nat. Ord. LOGANIACEÆ.

Strychnos Nux Vomica. —— **Koochla Tree.** —— *East Indies.*	1. *Nux Vomica.* The seeds. 2. *Strychnina.* An alkaloid obtained from Nux Vomica.	1. *Strychnine* 2. *Brucine* 3. *Igasurine* } = alkaloids. 4. Igasuric or strychnic acid.

Nat. Ord. GENTIANACEÆ.

Ophelia Chirata. —— **Chiretta.** —— *N. India.*	*Chirata* — *Chiretta.* The entire plant, collected when the fruit begins to form, and dried.	1. *Ophelic acid.* 2. *Chiratin* = a bitter resin.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Gentiana Lutea. **Gentian.** *European Mountains. Pyrenees.*	*Gentianæ Radix.—Gentian Root.* The dried root.	1. *Gentianic acid.* Crystalline. 2. *Gentianin.* Neutral, crystalline. The active principle. 2. Sugar, volatile oil, gum.

Nat. Ord. CONVOLVULACEÆ.

Ipomœa or **Exogonium Purga.** **Jalap.** *Mexico.*	1. *Jalapa — Jalap.* The dried tubercules.	1. Resin = about 18 per cent. 2. Sugar, starch, gum, &c.
	2. *Jalapæ Resina—Jalap Resin.* Extracted from jalap, by means of rectified spirit.	1. *Convolvulin.* An acid glucoside. 2. *Jalapin* or *Jalapic acid.* A resin soluble in ether.
Convolvulus Scammonia. **Scammony.** *Asia Minor and Syria.*	1. *Scammoniæ Radix—Scammony Root.* The dried root.	1. Resin = about 4 per cent. 2. Gum = 6 per cent. 3. Sugar, starch, extractive, &c.
	2. *Scammonium — Scammony.* A gum-resin obtained by incision from the living root, hardened in the air.	1. Resin = 80 to 90 per cent. 2. Gum.
	3. *Scammoniæ Resina — Scammony Resin.* Made by a special process, from the root or from scammony.	

Nat. Ord. SOLANACEÆ.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Capsicum Fastigiatum. — **Chillies.** — *Zanzibar.*	*Capsici Fructus — Capsicum Fruit.* The dried ripe fruit.	1. *Capsicin* = a crystalline alkaloid; volatile, acrid. 2. Red colouring matter.

Nat. Ord. ATROPACEÆ.

Atropa Belladonna. — **Deadly Night-Shade.** — *Indigenous.* — The root is also imported in a dried state from Germany.	1. *Belladonnæ Folia.* *a.* The fresh leaves and the branches to which they are attached. *b.* The leaves separated, carefully dried, gathered in June when the fruit has begun to form, from wild or cultivated plants in Britain. 2. *Belladonnæ Radix — Belladonna Root.* The dried root, collected in early spring. 3. *Atropina — Atropine.* The alkaloid obtained from Belladonna. 4. *Atropinæ Sulphas — Sulphate of Atropine.*	1. *Atropine*, the active alkaloid, in all parts. 2. *Asparagine*, in the leaves. 3. *Belladonin*, an amorphous alkaloid, in the root.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Hyoscyamus Niger. — **Henbane.** — *Indigenous.*	*Hyoscyami Folia—Hyoscyamus Leaves.* *a.* The fresh leaves and flowers, with the branches to which they are attached. Collected from biennial plants, growing wild or cultivated in Britain, when about two-thirds of the flowers are expanded. *b.* The leaves separated from the branches and flowering-tops, carefully dried.	1. *Hyoscyamine*, an alkaloid. 2. Malic acid.
Datura Stramonium. — **Thorn Apple.** — *Indigenous.*	*Stramonii Semina—Stramonium Seeds.* The dried ripe seeds.	1. *Daturine*, an alkaloid. 2. Malic acid.
Nicotiana Tabacum. — **Tobacco.** — *Tropical America.*	*Tabaci Folia — Tobacco Leaves.* The dried leaves.	1. *Nicotine*, a colourless volatile alkaloid. 2. *Nicotianin*, a concrete volatile oil.

Nat. Ord. SCROPHULARIACEÆ.

Digitalis Purpurea. — **Foxglove.** — *Indigenous.*	*Digitalis Folia — Digitalis Leaves.* The leaves. Collected from wild British plants of the second year's growth, when about two-thirds of flowers are expanded.	1. *Digitalin*, a bitter, neutral, non-nitrogenized principle, a glucoside. 2. *Digitalein*, bitter, amorphous.

Nat. Ord. LABIATÆ.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Lavandula Vera. —— **Lavender.** —— *Indigenous.*	*Oleum Lavandulæ—Oil of Lavender.* Volatile oil distilled in Britain from the flowers.	
Mentha Piperita. —— **Peppermint.** —— **Mentha Arvensis.** —— *Indigenous.*	1. *Oleum Menthæ Piperitæ.—Oil of Peppermint.* Volatile oil distilled in Britain from the fresh flowering herb. 2. *Menthol.* A stearoptene obtained by cooling the oil of both plants.	1. *Menthol.* 2. *Menthene*, a liquid.
Mentha Viridis. —— **Spearmint.** —— *Indigenous.*	*Oleum Menthæ Viridis—Oil of Spearmint.* Volatile oil distilled in Britain from the fresh flowering plant.	
Rosmarinus Officinalis. —— **Rosemary.** —— *S. Europe.*	*Oleum Rosmarini—Oil of Rosemary.* Volatile oil distilled from the flowering tops.	
Thymus Vulgaris. —— **Thyme.** —— *Indigenous.*	*Thymol.* A stearoptene obtained from the volatile oil. (*See also* UMBELLIFERÆ).	

D. Monochlamydeæ.

Nat. Ord. POLYGONACEÆ.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Rheum Palmatum, Officinale, and other species. **Rhubarb.** *China, Chinese Tartary,* and *Thibet.*	*Rhei Radix — Rhubarb Root.* The root, more or less deprived of its bark, sliced and dried.	1. *Chrysophanic acid.* 2. Oxalate of lime = 35 to 40 per cent. 3. Tannic and gallic acids. 4. A bitter substance. 5. Resin.

Nat. Ord. THYMELACEÆ.

Daphne Mezereum or **Laureola.** **Spurge Laurel.** *Central Europe.*	*Mezerei Cortex — Mezereon Bark.* The dried bark.	1. *Daphnin,* a crystallizable glucoside. 2. Volatile oil. 3. Acrid resin.

Nat. Ord. MYRISTICACEÆ.

Myristica Fragrans. **Nutmeg.** *Eastern Archipelago.* Imported from *Sumatra,* and the *Molucca Islands.*	1. *Myristica — Nutmeg.* The kernel of the seeds, dried. 2. *Oleum Myristicæ — Oil of Nutmeg.* The volatile oil distilled in Britain from nutmegs. 3. *Oleum Myristicæ Expressum — Expressed Oil of Nutmeg.* A concrete oil obtained from nutmeg by expression and heat.	1. Volatile oil. 2. Fatty acids, especially *Myristicin*

Nat. Ord. LAURACEÆ.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Cinnamomum Camphora. — **Camphor Plant.** — *China; Japan.*	*Camphora — Camphor.* A stearoptene obtained from the wood, and purified in this country by sublimation.	
Cinnamomum Zeylanicum. — **Cinnamon.** — *Ceylon.*	1. *Cinnamomi Cortex—Cinnamon Bark.* The inner bark of shoots from the truncated stocks, dried. 2. *Oleum Cinnamomi—Oil of Cinnamon.* The volatile oil distilled from cinnamon bark.	1. Volatile oil. 2. Tannic acid. 3. Cinnamic acid. 4. Resin.
Nectandra Rodiæi. — **Bebeeru** or **Greenheart Tree.** — *British Guiana.*	1. *Nectandra Cortex—Bebeeru Bark.* The dried bark. 2. *Beberinæ Sulphas—Sulphate of Beberine.* Prepared from the Bebeeru bark.	1. Beberina } alkaloids. 2. Nectandra } 3. Tannic acid. 4. Resin, &c.
Sassafras Officinale. — *N. America.*	*Sassafras Radix—Sassafras Root.* The dried root, in chips or shavings.	1. Volatile oil. 2. Tannic acid. 3. Red colouring matter.

Nat. Ord. ARISTOLOCHIÆ.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Aristolochia Serpentaria and **Reticulata.** — **Serpentary.** — *Virginia; United States.*	*Serpentariæ Rhizoma—Serpentary Rhizome.* The dried rhizome and rootlets.	1. Volatile oil. 2. Resin. 3. Tannic acid. 4. Amorphous bitter extractive matter.

Nat. Ord. EUPHORBIACEÆ.

Croton Eluteria. — **Cascarilla.** — *Bahamas.*	*Cascarillæ Cortex—Cascarilla Bark.* The dried bark.	1. *Cascarillin* = bitter, neutral, crystalline. 2. Resin. 3. Tannic acid. 4. Volatile oil.
Croton Tiglium. — **Croton Oil Plant.** — *East India.*	*Oleum Crotonis—Croton Oil.* The oil expressed in Britain from the seeds.	1. Ordinary fatty acids. 2. Acetic, butyric, valerianic acids. 3. *Tiglinic* and *crotonic* acids.
Mallotus Philippinensis. — **Wurrus.** — *India.*	*Kamala.* A powder consisting of minute glands and hairs obtained from the surface of the fruits.	1. Resin = *Rottlerin* = 80 per cent. 2. Tannic acid. 3. Volatile oil.
Ricinus Communis. — **Castor Oil Plant.** — *E. India* and *America.*	*Oleum Ricinis—Castor Oil.* The oil expressed from the seeds.	1. Ricinate 2. Ricinoleate. 3. Ricinstearate. } of glycerine. 4. Acrid resin.

Nat. Ord. PIPERACEÆ.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Piper Cubeba. — **Cubebs Pepper.** — *Java.*	1. *Cubeba—Cubebs.* The dried unripe full-grown fruit. 2. *Oleo-Resina Cubebæ — Oleo-Resin of Cubebs.* Obtained from cubebs by means of ether. 3. *Oleum Cubebæ.* The volatile oil distilled in Britain from cubebs.	1. Volatile oil. 2. *Cubebin* = crystalline, inert. 3. *Cubebic acid.* 4. Resin, gum, &c.
Piper Angustifolium. — **Matico.** — *Peru.*	*Maticæ Folia—Matico Leaves.* The dried leaves.	1. *Artanthic Acid* = crystalline. 2. Volatile oil and resin. 3. Trace of tannic acid.
Piper Nigrum. — **Black Pepper.** — *E. Indies.*	*Piper Nigrum — Black Pepper.* The dried unripe fruit.	1. Acrid resin. 2. Volatile oil. 3. *Piperin* = neutral.

Nat. Ord. MORACEÆ.

Morus Nigra. — **Mulberry.** — *Indigenous.*	*Mori Succus—Mulberry Juice.* The deep purple juice of the ripe fruit.	1. Sugar. 2. Malic acid. 3. Gum, pectin, salts, &c.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Ficus Carica. — **Fig Tree.** — *Smyrna.*	*Ficus — Fig.* The dried fruit.	Saccharine and mucilaginous matters.

Nat. Ord. CANNABINACEÆ.

Cannabis Sativa. — *India.*	*Cannabis Indica—Indian Hemp.* The dried flowering tops of the female plant, from which the resin has not been removed.	1. Resin = *Cannabin.* 2. Volatile oil.
Humulus Lupulus. — **Hop.** — *Indigenous.*	1. *Lupulus — Hop.* The dried catkins or strobiles. 2. *Lupulin.* A glandular powder obtained from the strobiles.	1. Volatile oil. 2. Resin and gum. 3. Tannic acid. 4. *Lupulite* or *Humulin*, a bitter principle.

Nat. Ord. SALICACEÆ.

Salix Alba, and other species. — **Willow.** — *Indigenous.*	*Salicinum—Salicine.* A crystalline glucoside, obtained from the bark.	

Nat. Ord. CUPULIFERÆ.

Quercus Robur. — **Common Oak.** — *Indigenous.*	*Quercus Cortex—Oak Bark.* The dried bark of the smaller branches and young stems, collected in spring from trees growing in Britain.	1. *Querco-tannic acid.* 2. Sugar, pectin, &c.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Quercus Lusitanica. — **Gall** or **Dyer's Oak.** — *Asia Minor.*	1. *Galla—Galls.* Excrescences on the twigs or young branches, caused by the puncture and deposited ova of the *Cynips Gallæ Tinctoriæ*, a Hymenopterous insect. 2. *Acidum Gallicum—Gallic Acid.* Prepared from galls. 3. *Acidum Tannicum—Tannic Acid.* Extracted from galls.	1. *Tannic acid*=35 per cent. 2. *Gallic acid* = 5 per cent. 3. Ellagic acid = crystalline. 4. Gum, starch, &c.

Nat. Ord. LIQUIDAMBARACEÆ.

Liquidambar Orientalis. — *Asia Minor.*	*Styrax Præparatus—Prepared Storax.* A balsam prepared from the inner bark, purified by means of rectified spirit and straining.	1. Resin. 2. Volatile oil = *Styrol.* 3. Cinnamic acid. 4. *Styracin* = solid and crystalline.

Nat. Ord. SANTALACEÆ.

Santalum Album. — *India.*	*Oleum Santali—Oil of Sandal-wood.* The oil distilled from the wood.	

E. Gymnospermeæ.

Nat. Ord. CONIFERÆ or PINACEÆ.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Juniperus Communis. — **Juniper.** — *N. Europe.*	*Oleum Juniperi—Oil of Juniper.* Volatile oil distilled in Britain from the full-grown unripe green fruit.	
Juniperus Sabina. — **Savin.** — *Indigenous.*	1. *Sabinæ Cacumina—Savin Tops.* The fresh and dried tops, collected in spring. 2. *Oleum Sabinæ—Oil of Savin.* The oil distilled in Britain from the fresh tops.	1. Volatile oil. 2. Resin. 3. Gallic acid.
Pinus Larix. — **Larch.** — *Europe.*	*Laricis Cortex—Larch Bark.* The bark, collected in spring, deprived of its outer rough portion, and dried.	1. Turpentine. 2. Gum. 3. Tannic acid. 4. *Larixin* or *Larixynic acid* = crystalline.
Pinus Picea or **Abies Excelsa.** — **Spruce Fir.** — *Switzerland.*	*Pix Burgundica—Burgundy Pitch.* A resinous exudation from the stem, melted and strained.	1. Resin. 2. A little volatile oil.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Pinus Balsamea. — **Balm of Gilead Fir.** — *Canada.*	*Terebinthina Canadensis—Canada Turpentine* or *Balsam.* The turpentine obtained by puncturing or incising the bark of the trunk and branches.	1. Resin. 2. Volatile oil.
Pinus Australis or **Palustris, Tæda, Pinaster, Sylvestris,** &c. — *America; France; Northern Europe.*	1. *Thus Americanum — Common Frankincense.* The concrete turpentine scraped off the trunk of the *Pinus Palustris* and *Tæda.*	1. Resin. 2. Volatile oil = about 17 per cent.
	2. *Oleum Terebinthinæ—Oil or Spirit of Turpentine.* The oil distilled, usually by aid of steam, from the oleo-resin (*turpentine*) obtained from all species; rectified if necessary.	
	3. *Resina — Resin.* The residue left after the distillation of the crude turpentine of various species of *Pinus.*	*Acids* = Pinic, Sylvic, and Pimaric.
	4. *Oleum Pini Sylvestris—Fir-Wood Oil.* The oil distilled from the fresh leaves of *Pinus sylvestris.*	
	5. *Pix Liquida—Tar.* A bituminous liquid obtained from the wood of *Pinus sylvestris* and other species, by destructive distillation.	1. Oil of turpentine, creasote, and other compounds obtained by distillation. 2. Pitch remains = black resin.

II. ENDOGENÆ—ENDOGENS.

Nat. Ord. SMILACEÆ.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Coustituents.
Smilax Officinalis. —— **Sarsaparilla.** —— *Central America.*	*Sarsæ Radix—Sarsaparilla Root.* The dried root. It is commonly known as Jamaica Sarsaparilla, from having been formerly obtained from Central America by way of that island.	1. *Sarsaparillin* or *Smilacin* = neutral, crystalline, bitter. 2. Volatile oil. 3. Starch, &c.

Nat. Ord. ZINGIBERACEÆ.

Elettaria Cardamomum. —— **Cardamom.** —— *Malabar.*	*Cardamomi Semina—Cardamom Seeds.* The dried ripe seeds, contained in their pericarps. The seeds only are used.	1. Volatile oil. 2. Acrid resin. 3. Colouring matter.
Zingiber Officinale. —— **Ginger.** —— *E.* and *W. Indies.*	*Zingiber — Ginger.* The rhizome, scraped and dried.	1. Volatile oil. 2. Resinous matter. 3. Starch, &c.
(*In Appendix*). **Curcuma Longa.** —— *Ceylon.*	*Curcuma—Turmeric.* The dried rhizome.	1. Volatile oil. 2. *Curcumin* = yellow colouring matter.

Nat. Ord. IRIDACEÆ.

Crocus Sativus. —— **Crocus.** —— *S. Europe.*	*Crocus — Saffron.* The dried stigmas and top of the style of the flower.	Colouring matter.

Nat. Ord. LILIACEÆ.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Aloe Vulgaris, Perryi, &c. Imported from *Barbadocs* and the *Dutch West Indian Islands.* Imported principally by way of *Bombay* and *Zanzibar.*	1. *Aloe Barbadensis* — *Barbadocs Aloes.* The inspissated juice of the cut leaves of *Aloe Vulgaris.* 2. *Aloe Socotrina.*— *Socotrine Aloes.* The inspissated juice of the cut leaves of *Aloe Perryi*, and probably other species. 3. *Aloin.* A crystalline substance obtained from aloes.	1. *Aloin* of various kinds = crystalline and amorphous. 2. Resin, especially in *Socotrine.* 3. *Aloctic acid.* 4. Trace of volatile oil.
Urginea Scilla. — **Squill.** — *S. Europe.*	*Scilla—Squill.* The bulb, divested of its dry membranous outer scales, cut into slices, and dried.	1. Bitter resinous extractive. 2. *Scillitin.* 3. Peculiar acrid resin. 4. Trace of tannic acid.

Nat. Ord. MELANTHACEÆ.

Colchicum Autumnale. — **Meadow Saffron.** — *Indigenous.*	1. *Colchici Cormus* — *Colchicum Corm.* The fresh corm, collected about the end of June or early in July; and the same stripped of its coats, sliced transversely, and dried under 150°. 2. *Colchici Semina.* The seeds, collected when fully ripe, and carefully dried.	1. *Colchicine* = crystalline. 2. *Cevadic acid.* 3. Gum, starch, &c.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Schœnocaulon Officinale, &c. *Mexico.*	1. *Sabadilla—Cevadilla.* The dried ripe seeds. Sometimes imported in or mixed with their pericarps. 2. *Veratrina—Veratrine.* An alkaloid or mixture of alkaloids obtained from Sabadilla.	1. *Veratrina.* 2. *Sabadilline.* 3. Acids { Gallic. Veratric. Cevadic.
Veratrum Viride. **Green Hellebore.** *N. America.*	*Veratri Viridis Rhizoma — Green Hellebore Rhizome.* The rhizome, collected in autumn, and dried.	1. *Veratrina* } alkaloids. 2. *Viridia.* }

Nat. Ord. GRAMINACEÆ.

Triticum Sativum. **Wheat.** **Zea Mays.** **Maize.** **Oryza Sativa.** **Rice.** *Indigenous.*	1. *Farina Tritici—Wheaten Flour.* The grain of wheat ground and sifted. 2. *Amylum—Starch.* Procured from the grains of common wheat, maize, and rice. 3. *Mica Panis — Crumb of Bread.* Made with wheaten flour.	1. Starch = about 70 per cent. 2. Gluten = about 10 per cent. 3. Gum, sugar, salts, &c.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Hordeum Distichon. — **Barley.** — *Indigenous.*	*Hordeum Decorticatum—Pearl Barley.* The dried seed, divested of its integuments.	Gluten, starch, gum, sugar, salts, &c.
Saccharum Officinarum. — **Sugar Cane.** — *W. Indies.*	1. *Saccharum Purificatum—Refined Sugar.* Pure cane-sugar. 2. *Theriaca—Treacle.* The uncrystallized residue of the refining of sugar.	
Secale Cereale. — **Common Rye.** — *Indigenous.*	1. *Ergota — Ergot.* The sclerotium (compact mycelium or spawn) of a vegetable fungus, the *Clavieeps Purpurea*, growing between the paleæ of the rye, and replacing the grain. 2. *Ergotinum—Ergotin.* Purified extract of ergot.	Composition not definitely known, but most recent researches give :— 1. *Ergotinic acid.* 2. *Sphacelinic acid.* 3. *Cornutine* } alkaloids. 4. *Ergotinine* } 5. Fixed oil (35 per cent.), colouring matters, sugar, &c.

III. ACROGENS.

Nat. Ord. FILICES.

Aspidium Filix Mas. — **Male Fern.** — *Indigenous.*	*Filix Mas — Male Fern.* The dried rhizome, with the bases of the petioles. Collected late in summer, divested of its scales, roots, and all dead portions, and carefully dried with a gentle heat.	1. Volatile oil. 2. Fixed oils. 3. Resin, gum, starch, &c. 4. Tannin.

Nat. Ord. FUNGI.

Botanical Source or Name of Plant. Geographical Source.	Officinal Nature = Part of Plant or Product.	Active Principles, and Chief Constituents.
Torula Cerevisiæ. — **Yeast Plant.**	*Cerevisiæ Fermentum—Beer Yeast.* The ferment obtained in brewing beer.	

Nat. Ord. LICHENES.

Cetraria Islandica. — **Iceland Moss.** — *North Europe.*	*Cetraria — Iceland Moss.* The entire dried lichen.	1. *Lichenin* or lichen starch. 2. *Cetraric acid.* 3. Bitter principle = crystalline.
Roccella Tinctoria, &c. — *The Azores.*	*Lacmus — Litmus.* (In *Appendix*). A blue pigment prepared from various species.	

GROUPS OF VEGETABLE DRUGS.

The student, having obtained from the preceding Tables a general knowledge of the drugs derived from the vegetable kingdom, may now proceed to study them more particularly in groups, arranged according to their nature. In relation to individual drugs, I have endeavoured, where necessary, to bring out any point of importance in their *mode of preparation;* and also to state prominently their chief *characters*, when these are given in the B.P. In the case of the less important drugs, however, the student need not burden his memory with their full description, if he only knows how to recognise them.

With respect to *Pharmacy*, I have followed the same plan as in the case of the inorganic drugs, and the remarks made in relation to that class of drugs apply to those now to be considered.

Group I.—ENTIRE PLANT.

Name.	Source.	Natural Order.
1. Cetraria—Iceland Moss.	Cetraria Islandica.	Lichenes.
2. Chirata—Chiretta	Ophelia Chirata.	Gentianaceæ.
3. Lactuca—Lettuce.	Lactuca Virosa.	Compositæ.
4. Lobelia—Lobelia.	Lobelia Inflata.	Lobeliaceæ.

1. Cetraria—Iceland Moss.—The dried lichen.

Description.—*a*. Foliaceous; much branched in an irregular dichotomous manner into obtuse or truncate flattened lobes.

b. Crisp, smooth, and usually brownish- or greyish-white above, whitish beneath, and marked irregularly with small white depressed spots.

c. Almost odourless when dry, but when moistened with water having a feeble sea-weed-like odour; taste mucilaginous and slightly bitter.

d. A strong decoction gelatinizes on cooling.

PHARMACY.—*Officinal Preparation:*—

Decoctum Cetrariæ.

Iceland moss, ℥ 1
Distilled water, O 1 } Boil for 10 minutes, after washing with cold water. Strain, and make up to O 1.

ACTION.—Iceland moss is a **demulcent** and **nutrient.**

Dose—Of Infusion, fl ℥ 1 to 4.

2. CHIRATA—CHIRETTA.—The dried plant. Collected when the fruit begins to form.

DESCRIPTION. — *a.* Root, 2 or 3 inches long, usually unbranched.

b. Stem, 3 feet or more long, rounded below and slightly quadrangular above, branched in a dichotomous manner, smooth, orange-brown or purplish. Except in the lower part it consists of a thin woody ring, enclosing a large continuous easily-separable pith of a yellowish colour.

c. Leaves ovate, 5-7 ribbed; flowers small, numerous.

d. No odour; taste, very bitter.

PHARMACY.—*Officinal Preparations:*—

a. Infusum Chiratæ.

Chiretta, cut small, ℥ ¼
Distilled water, at 120°, fl ℥ 10. } Infuse half an hour, and strain.

b. Tincturæ Chiratæ.

Chiretta, cut small and bruised, ℥ 2½
Proof spirit, O 1. } Made by maceration for 48 hours, and percolation.

ACTION.—Chiretta is a simple bitter, and is used as a **gastric** and **general tonic.**

Doses—Of Infusion, fl ℥ 1 to 2; Tincture, fl ℥ ½ to 2.

3. LACTUCA — LETTUCE. — The flowering herb. No description is given in the B.P.

PHARMACY.—*Officinal Preparation :—*

Extractum Lactucæ.—A *green extract*, made from the juice in the usual way.

ACTION.—The extract of lettuce is used as a **hypnotic;** and is also sometimes made up into pills with purgatives, to act as a **carminative.**

Dose—Of Extract, gr. 5 to 15.

4. LOBELIA.—The dried flowering herb.

DESCRIPTION.—*a.* Usually in compressed oblong rectangular parcels, weighing from half a pound to one pound, and wrapped in sealed and labelled papers.

b. The separate pieces are of varying lengths, yellowish-green, angular, and bearing sessile or stalked hairy oval irregularly-toothed leaves, together with some flowers and fruits.

c. Odour somewhat irritating; taste, at first mild, but after chewing, burning and acrid.

PHARMACY.—*Officinal Preparations :—*

a. Tinctura Lobeliæ.

Lobelia, in No. 40 powder, ℥ 2½
Proof Spirit, O 1.
} Made by maceration for 48 hours, and percolation.

b. Tinctura Lobeliæ Ætherea.

Lobelia, in coarse powder, ℥ 2½
Spirit of ether, O 1.
} Macerate for 7 days, strain, and make up to O 1.

ACTION.—Lobelia is almost solely employed as a **pulmonary sedative** and **antispasmodic.** In large doses it is **irritant** to the alimentary canal, acting as an **emetic** and **purgative.** It is also **diuretic** and **diaphoretic.** In poisonous doses it is a **general depressant.**

Dose—Of either Tincture, ♏ 10 to 30.

Group II.—ROOTS AND RHIZOMES.

Although botanically roots and rhizomes are not the same, rhizomes being in reality underground stems, and although the B.P. now recognises them separately, they may be conveniently grouped together for practical purposes, and they are in several instances used together. The officinal members of this group are very numerous, and the following tabular arrangement may afford some help in remembering them.

A. Entire Roots and Rhizomes, or Elongated Pieces.

Name.	Source.	Natural Order.
1. Aconiti Radix.	Aconitum Napellus.	Ranunculaceæ.
2. Armoraciæ Radix.	Cochlearia Armoracia.	Cruciferæ.
3. Belladonnæ Radix.	Atropa Belladonna.	Atropaceæ.
4. Gentianæ Radix.	Gentiana Lutea.	Gentianaceæ.
5. Glycyrrhizæ Radix.	Glycyrrhiza Glabra.	Leguminosæ.
6. Krameriæ Radix.	Krameria Triandra and Ixina.	Polygalacæ.
7. Pareiræ Radix.	Chondodendron Tomentosum.	Menispermaceæ.
8. Podophylli Rhizoma.	Podophyllum Peltatum.	Ranunculaceæ.
9. Pyrethri Radix.	Anacyclus Pyrethrum.	Compositæ.
10. Scammoniæ Radix.	Convolvulus Scammonia.	Convolvulaceæ.
11. Taraxaci Radix.	Taraxacum Officinale.	Compositæ.

B. Short Transverse Sections.

12. Calumbæ Radix.	Jateorhiza Calumba.	Menispermaceæ
13. Sumbul Radix.	Ferula Sumbul.	Umbelliferæ.

C. Branched Roots or Rhizomes with Rootlets.

14. Arnicæ Rhizoma.	Arnica Montana.	Compositæ.
15. Cimicifugæ Rhizoma.	Cimicifuga Racemosa.	Ranunculaceæ.
16. Gelsemium.	Gelsemium Nitidum.	Apocynaceæ.
17. Senegæ Radix.	Polygala Senega.	Polygalaceæ.
18. Serpentariæ Radix.	Aristolochia Serpentaria.	Aristolochiæ.
19. Valerianæ Rhizoma.	Valeriana Officinalis.	Valerianaceæ.
20. Veratri Viridis Rhizoma.	Veratrum Viride.	Melanthaceæ.

D. Miscellaneous Group.

21. Filix Mas.	Aspidium Filix Mas.	Filices.
22. Hemidesmi Radix.	Hemidesmus Indicus.	Asclepiadaceæ.
23. Ipecacuanha.	Cephaelis Ipecacuanha.	Cinchonaceæ.
24. Rhei Radix.	Rheum Palmatum, etc.	Polygonaceæ.
25. Sarzæ Radix.	Smilax Officinalis.	Smilaceæ.
26. Sassafras Radix.	Sassafras Officinale.	Lauraceæ.
27. Zingiber.	Zingiber Officinale.	Zingiberaceæ.

E. Bark of Root.

28. Granati Radicis Cortex.	Punica Granatum.	Myrtaceæ.

Having thus enumerated and classified the drugs belonging to this group, they will now be individually considered in alphabetical order.

1. Aconiti Radix—Aconite Root.—The root collected in the winter or early spring, before the leaves have appeared, from plants cultivated in Britain, and carefully dried; or imported in a dried state from Germany.

Description.—*a*. Usually from 2 to 3 inches long; and from $\frac{1}{2}$ to $\frac{3}{4}$ inch thick at the upper extremity, where it is usually crowned with the base of the stem.

b. Conical in form, much shrivelled longitudinally.

c. More or less covered with the scars or bases of broken rootlets.

d. Dark-brown externally; whitish internally, and having a central cellular axis with about seven rays.

e. No marked odour; taste at first somewhat bitterish-sweet, but exciting slowly when chewed, after some minutes, a sensation of tingling and numbness which lasts for some time.

PHARMACY.—*Officinal Preparations:*—

a. Linimentum Aconiti.

Aconite root, in No. 40 powder, ℥ 20
Camphor, ℥ 1
Rectified spirit, sufficient to make fl ℥ 30 } .

Macerate the root in the spirit for 3 days, and percolate into a receiver containing the camphor.

b. Tinctura Aconiti.

Aconite root in No. 40 powder, ℥ 2½
Rectified spirit, O 1 } Made by maceration for 48 hours, and percolation.

ACTION.—Aconite root owes its physiological and therapeutic effects to the aconitine which it contains. *Locally* applied it causes numbness and tingling, and is a powerful **anodyne,** employed in the form of liniment. Internally the tincture is used as a **vascular depressant, antipyretic,** and **anodyne.** It is also a **diaphoretic** and **diuretic.** In poisonous doses it affects the nerve-endings and the spinal cord, causing paralysis.

Dose—Of Tincture, ♏ 5 to 15.

2. ARMORACIÆ RADIX—HORSE-RADISH ROOT.—The fresh root, from plants cultivated in Britain. Most active in autumn and early spring, before the leaves have appeared.

DESCRIPTION.—*a.* Nearly cylindrical, except at the upper end, where it is enlarged and conical, and marked in an annulated manner by the scars of fallen leaves.

b. From ½ to about an inch in diameter, and commonly a foot or more in length.

c. Pale yellowish-white or brownish-white externally, white and fleshy within.

d. Exhales a characteristic pungent odour when scraped or bruised. Taste very pungent.

PHARMACY.—*Officinal Preparation*:—

Spiritus Armoraciæ Compositus.—Sp. gr. about 0·920.

Horse-radish root, scraped Bitter-orange peel, cut small and bruised	of each ℥ 20	Mix, and distil C 1.
Nutmeg, bruised, ℥ ½		
Proof spirit, C 1		
Water, O 3		

ACTION.—Locally applied horse-radish may be employed as a **rubefacient.** Internally it is a **sialagogue, carminative** and **peptogen,** being frequently used as a **condiment.**

Dose—Of Compound Spirit, fl ʒ 1-2.

3. ARNICÆ RHIZOMA—ARNICA RHIZOME.—The dried rhizome and rootlets.

DESCRIPTION.—*a.* Rhizome from 1 to 2 inches or more in length, about ⅛ to ¼ inch in diameter; cylindrical and contorted.

b. Dark brown, rough from the scars of fallen leaves, some remains of which are usually found at its upper end, and giving off from its under surface numerous long dark brown filiform wiry rootlets. (Fewer and less contorted than serpentary; more slender than veratrum viride).

c. Peculiar odour and somewhat aromatic; apt to excite sneezing; acrid and bitterish taste.

PHARMACY.—*Officinal Preparation*:—

Tinctura Arnicæ.

Arnica, in No. 40 powder, ℥ 1 Rectified spirit, O 1	Made by maceration for 48 hours, and percolation.

Action.—Tincture of arnica mixed with water is chiefly employed as an external application for bruises. Internally it is seldom given, but is regarded as a **stimulant** to most of the organs. In poisonous doses it acts as an **irritant** to the alimentary canal, and **general depressant.**

Dose—Of Tincture, fl 3 ½ to 1.

4. Belladonnæ Radix—Belladonna Root.—The dried root, collected from plants growing wild or cultivated in Britain; or imported in a dried state from Germany.

Description.—*a.* Rough irregular branched pieces, generally marked at the upper end by the hollow bases of the stems.

b. From 1 to 2 feet long, but usually in shorter pieces; ½ to 1 inch thick.

c. Externally covered with a dirty-grey or brownish integument, easily scraped off by the nail, the exposed surface being whitish.

d. Breaks readily with a short fracture; surface then shows a thin cortical portion of yellowish or pale-brown colour, separated by a dark line from a large central portion of brownish colour, and marked throughout by scattered darker-coloured dots, but without evident medullary rays.

Pharmacy.—1. *Official Preparations:*—

a. Emplastrum Belladonnæ.

Alcoholic extract of belladonna, 1
Resin plaster } of each, 2.
Soap plaster } Melt the plasters by a water-bath, add the extract, and mix thoroughly.

b. Extractum Belladonnæ Alcoholicum.—Made by macerating belladonna root with rectified spirit for 48 hours, and afterwards with water; percolating; and evaporating by a water-bath to a suitable consistence.

c. Linimentum Belladonnæ.

Belladonna root, 20
Camphor, 1
Rectified spirit, 30.
} Macerate for 3 days, and percolate into a receiver containing the camphor.

d. Unguentum Belladonnæ.

Alcoholic extract of belladonna, 1
Benzoated lard, 9.
} Mix thoroughly.

2. Belladonna root is the source of *Atropine*.

Action.—The preparations made from belladonna root are almost entirely used as *local* remedies, being valuable **anodynes, anhydrotics,** and **mydriatics.** The alcoholic extract may be given internally, its effects being similar to those of the other preparations administered internally. (*See* Belladonna Leaves).

Dose—Of Alcoholic Extract, gr. $\frac{1}{10}$ to $\frac{1}{4}$.

5. Calumbæ Radix—Calumba Root.—The dried transversely cut slices of the root.

Description.—*a.* In irregular flattish circular or somewhat oval slices, from about 1 to 2 inches or more in diameter, and $\frac{1}{8}$ to $\frac{1}{2}$ inch or more in thickness; concave in the centre on both surfaces.

b. The cortical portion is thick, covered by a wrinkled brownish-yellow coat, and separated from the central portion by a fine dark-coloured line. Colour greyish- or greenish-yellow.

c. The pieces break readily with a mealy fracture, and are easily reduced to powder.

d. Odour feeble, somewhat musty; taste bitter.

Pharmacy.—1. *Officinal Preparations :—*

a. Extractum Calumbæ.—Made by twice macerating calumba root, cut small, in proof spirit, straining and pressing; mixing and filtering the liquors; recovering the spirit by distillation; and evaporating by a water-bath.

b. Infusum Calumbæ.

Calumba root, cut small, 1 } Macerate half an
Cold distilled water, 20. } hour, and strain.

c. Tinctura Calumbæ.

Calumba root, cut small, ℥ 2½ } Made by maceration for 48 hours, and percolation.
Proof spirit, fl ℥ 20.

2. Calumba is contained in Mistura Ferri Aromatica.

Action. — Calumba is a **bitter stomachic tonic,** and acts indirectly as a **general tonic.**

Doses—Of Extract, gr. 2 to 10; Infusion, fl ℥ 1 to 2; Tincture, fl ʒ ½ to 2.

6. Cimicifugæ Rhizoma—Cimicifuga.—The dried rhizome and rootlets.

Description.—*a.* The rhizome is about from 2 to 6 inches long, and from ½ to 1 inch thick; hard.

b. Somewhat flattened-cylindrical in form, having on its upper surface the remains of several ærial stems, and below numerous small wiry brittle branched rootlets, which in commercial specimens are more or less broken off.

c. Rhizome and rootlets are brownish-black.

d. Fracture is close, that of the rootlets presenting a thick bark, and a central axis with from 3 to 5, usually 4, converging woody wedges, so as to assume a triangular, cross-like, or stellate appearance.

e. Almost odourless; taste bitter, slightly acrid.

Pharmacy.—1. *Officinal Preparations:—*

a. Extractum Cimicifugæ Liquidum.—An *alcoholic extract,* made by macerating Cimicifuga, in No. 60 powder, ℥ 20, in Rectified spirit, O 2; percolating; reserving the first fl ℥ 15; eva-

porating the remainder by a water-bath to a soft extract; dissolving this in the reserved position; and making up with spirit to fl ℥ 20.

b. Tinctura Cimicifugæ.

Cimicifuga, in No. 40 powder, ℥ 2½
Proof spirit, O 1.
} Made by maceration for 48 hours, and percolation.

2. *Incompatible.*—An infusion of cimicifuga is blackened by a persalt of iron.

Action.—Cimicifuga is said to be a **bitter stomachic, cardiac tonic, expectorant,** and **nervine stimulant** or **tonic.** It is especially used in certain forms of rheumatism and neuralgia. In large doses it causes nausea, vomiting, depression, headache, and giddiness.

Doses—Of Liquid Extract, ♏ 3 to 30; Tincture, ♏ 15 to 60.

7. Filix Mas—Male Fern.—The rhizome, with the persistent bases of the petioles. Collected late in the autumn, divested of its scales, roots, and all dead portions, and carefully dried with a gentle heat. Should not be used if more than a year old.

Description.—*a.* From 3 to 6 inches in length, and the rhizome itself is from ¾ to 1 inch in diameter, but being entirely covered by the hard persistent curved angular dark-brown bases of the petioles, is apparently 2 or more inches.

b. Brown externally; yellowish-white or brownish internally.

c. Odour feeble but disagreeable; taste sweetish and astringent at first, but subsequently bitter and nauseous.

Pharmacy.—*Officinal Preparation:*—

Extractum Filicis Liquidum. An oily extract.

Male fern, in coarse powder, lb 2
Ether, O 4, or a sufficiency
} Percolate

slowly until the ether passes colourless; evaporate by a water-bath, or recover the ether by distillation.

ACTION.—Male fern is an **anthelmintic,** particularly used for tape-worm.

Dose—Of Liquid Extract, ♏ 15 to 30.

8. GELSEMIUM — YELLOW JASMINE. The dried rhizome and rootlets.

DESCRIPTION.—*a.* Nearly cylindrical, from ½ an inch to 6 inches or more in length, and commonly from ¼ to ¾ inch in diameter, with small rootlets attached to, or mixed with, the larger pieces.

b. Light yellowish-brown externally, and marked longitudinally by dark purplish lines.

c. Fracture splintery; bark thin, presenting silky fibres in its liber, and closely attached to a pale yellow porous woody axis, with evident medullary rays, and with or without pith.

d. Odour somewhat narcotic and aromatic; taste bitter.

PHARMACY.—*Officinal Preparations:*—

a. Extractum Gelsemii Alcoholicum.—Made by macerating Gelsemium, in No. 60 powder, with Rectified spirit, O 2; percolating, and continuing the percolation with distilled water until O 2 have been collected; and evaporating by a water-bath.

b. Tinctura Gelsemii.

Gelsemium, in No. 40 powder, ℥ 2½
Proof spirit, O 1.
} Made by maceration for 48 hours, and percolation.

ACTION.—Applied to the eye, gelsemium acts as a **mydriatic.** Internally administered, however, it produces the contrary effect, being a **myotic.** Its chief use is for its action upon the nervous system, especially the spinal cord; it **paralyses** the sensory columns, and at first stimulates, but subsequently paralyses the motor centres. In large

doses it causes various nervous symptoms, and is a dangerous **cardiac** and **respiratory depressant.** Gelsemium is chiefly employed as a remedy for neuralgia, sick headache, or rheumatism; and in tetanus, or as an **antidote** in poisoning by strychnine.

Doses—Of Alcoholic Extract, gr. $\frac{1}{2}$ to 2; Tincture, ♏ 5 to 20.

9. Gentianæ Radix—Gentian Root.—The dried root.

Description.—*a.* In more or less cylindrical pieces or longitudinal slices, from a few inches to a foot or more in length, and from a half to about an inch thick.

b. Wrinkled in an annular manner when the pieces have been derived from the upper part of the root, and all marked with irregular longitudinal furrows.

c. Deep yellowish-brown externally, yellowish or reddish-yellow within. Bark thick, reddish, and separated from the central woody portion, which is somewhat spongy, by a dark-coloured cambium zone.

d. Tough and brittle when dry.

e. Odour heavy and peculiar; taste at first sweetish, but ultimately very bitter.

Pharmacy.—*Officinal Preparations:*—

a. Extractum Gentianæ.

Gentian root, sliced, ℔ 1
Boiling distilled water, C 1 } Infuse two hours; boil 15 minutes; pour off, press, and strain; evaporate by a water-bath.

b. Infusum Gentianæ Compositum.

Gentian root, sliced,
Bitter-orange peel, cut small, } of each gr. 55
Fresh lemon peel, cut small, ʒ ¼
Boiling distilled water, fl ʒ 10. } Infuse half an hour, and strain.

c. Tinctura Gentianæ Composita.

Gentian root, cut small and bruised, ℥ 1½
Bitter-orange peel, cut small and bruised, ℥ ¾
Cardamom seeds, bruised, ℥ ¼
Proof spirit, O 1.

} Made by maceration for 48 hours, and percolation.

Action.—Gentian is a **bitter stomachic tonic.**

Doses—Of Extract, gr. 2 to 10; Infusion, fl ℥ 1 to 2; Tincture, fl 3 ½ to 2.

10. Glycyrrhizæ Radix—Liquorice Root.—The root and subterranean stems or stolons, fresh and dried.

Description.—The following are the characters of the fresh and dried roots respectively.

Fresh Root.	Dried Root.
a. In long cylindrical pieces, of varying thickness.	*a.* Either peeled or unpeeled.
b. Smooth and yellowish-brown or somewhat reddish externally.	*b.* The unpeeled root resembles the fresh, but is somewhat darker, furrowed longitudinally. The peeled root has a yellow colour externally.
c. Yellow and juicy internally, very flexible, easily cut, and consisting of a thick cortical portion surrounding a central woody axis, which, in the case of the stem, contains a small pith.	*c.* The unpeeled root has a slightly acrid, and in some cases a feebly bitter taste, combined with the characteristic sweetness; when peeled there is no acridity.
d. Odour peculiar, earthy, and somewhat sickly; taste strong, peculiar, sweet.	

Pharmacy.—1. *Officinal Preparations:—*

a. Extractum Glycyrrhizæ.—Made by macerating liquorice root, in No. 20 powder, in cold distilled water; straining and pressing; heating to 212°; straining through flannel; and evaporating by a water-bath.

b. Extractum Glycyrrhizæ Liquidum.—Made as above, the strained liquid being evaporated to sp. gr. 1·160; one-sixth of its volume of rectified spirit added; and the mixture filtered after standing 12 hours.

c. Pulvis Glycyrrhizæ Compositus.

Senna, in fine powder, 2 Liquorice root, in fine powder, 2 Fennel fruit, in fine powder, 1 Sublimed sulphur, 1 Refined sugar, in powder, 6.	Mix thoroughly, pass through a fine sieve, and rub lightly in a mortar.

2. *Liquorice Root* is an ingredient in Confectio Terebinthinæ, Decoctum Sarsæ Compositum, Infusum Lini, Pilula Hydrargyri, and Pilula Ferri Iodidi.

The *extract* is contained in Confectio Sennæ, Decoctum Aloes Compositum, Tinctura Aloes, and Trochisci Opii; the *fluid extract* in Mistura Sennæ Composita, and Tinctura Chloroformi et Morphinæ.

Action.—Liquorice is used chiefly on account of its flavour, and for concealing the taste of other drugs; and as a **demulcent.** The compound powder is a useful **aperient.**

Doses—Of Extract, gr. 5 to ʒ 1; Liquid Extract, fl ʒ 1; Compound Powder, gr. 30 to 60.

11. Granati Radicis Cortex—Pomegranate Root Bark.—The dried bark of the root.

Description.—*a.* In quills or fragments, varying from 2 to 4 inches in length.

b. Outer surface yellowish-grey, wrinkled or cracked with faint longitudinal striæ, or more or less furrowed with corky bands; inner surface smooth or nearly so, and yellow.

c. Short fracture.

d. No odour; taste astringent and very feebly bitter.

PHARMACY.—1. *Officinal Preparation:*—

Decoctum Granati Radicis.

Pomegranate root bark, sliced, ℥ 2
Distilled water, O 2
} Boil down to O 1, strain, and make up to O 1.

2. *Incompatibles.*—Alkalies, lime-water, metallic salts, gelatine. An infusion becomes deep blackish-blue on the addition of a persalt of iron.

ACTION.—Pomegranate root bark is **astringent** and **anthelmintic.**

Dose—Of Decoction, fl ℥ 2 to 4.

12. HEMIDESMI RADIX—HEMIDESMUS ROOT.—The dried root.

DESCRIPTION.—*a*. In cylindrical, more or less twisted, longitudinally furrowed pieces, six inches or more in length.

b. Covered by a thin yellowish-brown or brown corky layer, which is easily separated from the other portion of the bark, the latter being frequently cracked in an annular manner.

c. Odour fragrant, resembling that of the melilot or Tonquin bean; taste sweetish and very slightly acrid.

PHARMACY.—*Officinal Preparation:*—

Syrupus Hemidesmi.—Sp. gr. about 1·335.

Hemidesmus root, bruised, ℥ 4
Refined sugar, ℥ 28
Boiling distilled water, O 1.
} Infuse four hours; strain, set aside, and decant; dissolve the sugar by a little heat.

ACTION.—Hemidesmus is regarded as an **alterative,** but it is seldom used.

Dose—Of Syrup, fl ℥ 1.

13. IPECACUANHA.—The dried root.

DESCRIPTION.—*a.* In more or less twisted pieces, usually from 2 to 4 inches long, and about the size of a small writing quill.

b. Consists of two parts, namely, a central inert whitish woody axis, and a thick cortical or active portion, which is brownish, greyish-brown, or reddish-brown, irregularly annulated, and having a resinous or waxy fracture.

c. Odour slight and peculiar, more especially when powdered; taste somewhat acrid and bitter.

PHARMACY.—1. *Officinal Preparations*:—

a. Pilula Ipecacuanhæ cum Scilla.

Compound powder of ipecacuanha, 3
Squill, in powder, 1
Ammoniacum, in powder, 1
Treacle, a sufficiency.
} Mix the powders, and beat them into a mass with the treacle.

b. Pulvis Ipecacuanhæ Compositus—Dover's Powder.

Ipecacuanha, in powder, 1
Opium, in powder, 1
Sulphate of potassium, in powder, 8
} Mix thoroughly, pass through a fine sieve, and rub lightly in a mortar.

c. Trochisci Ipecacuanhæ=gr. $\frac{1}{4}$ in each lozenge. Made in the usual way.

d. Trochisci Morphinæ et Ipecacuanhæ.

Ipecacuanha, gr. $\frac{1}{12}$
Hydrochlorate of morphine, gr. $\frac{1}{36}$
} in each lozenge.

Made in the usual way, but contains Tincture of Tolu.

e. Vinum Ipecacuanhæ.

Ipecacuanha, coarsely powdered, ℥ 1
Acetic acid, fl ℥ 1
Distilled water, a sufficiency
Sherry, O 1
}.

Macerate the ipecacuanha in the acid for 24 hours. Percolate with water to O 1. Evaporate to dryness over a water-bath. Powder the residue; macerate in the sherry for 48 hours, with occasional agitation; and filter.

2. Ipecacuanha is an ingredient in Pilula Conii Composita.

ACTION.—In small doses ipecacuanha is used as a **gastric sedative** and an **aid to purgatives.** In moderate doses it is a **diaphoretic** and **sedative expectorant.** In large doses it is **emetic;** and is also employed as a **specific** for dysentery. The compound powder owes its effects to the combination of ipecacuanha and opium.

Doses—Of Ipecacuanha, as expectorant, gr. $\frac{1}{2}$ to 2, as emetic, gr. 15 to 30; Compound Powder, gr. 5 to 15; Pill of Ipecacuanha with Squill, gr. 5 to 10; Lozenges, 1 to 3; Lozenges of Morphine and Ipecacuanha, 1 to 6; Wine, as expectorant, ♏ 5 to 40, as emetic, fl 3 1 to 6.

14. KRAMERIÆ RADIX—RHATANY ROOT.—The dried root. There are two varieties, namely:—(1) Peruvian; (2) Savanilla.

DESCRIPTION.—The two varieties of rhatany present the following characters:—

PERUVIAN.	SAVANILLA.
a. In branched or unbranched pieces, varying in length and thickness.	*a.* Less irregular and knotty, and not so long or thick.
b. Bark readily separable, varying in thickness from about $\frac{1}{20}$ to $\frac{1}{10}$ of an inch, rough and scaly except in the smaller pieces, dark reddish-brown externally, and bright brownish-red on its inner surface. Hard brownish- or reddish-yellow woody axis.	*b.* Bark adheres firmly to the wood beneath; is smooth and thicker; usually marked at irregular intervals by deep transverse cracks; dark purplish or violet colour.

c. The bark of both kinds has a strongly astringent taste, and when chewed tinges the saliva red; it has no marked odour. The wood is nearly tasteless and odourless.

PHARMACY.—*Officinal Preparations :—*

a. Extractum Krameriæ.—Made by macerating rhatany root, in No. 40 powder, in cold water; percolating; and evaporating by a water-bath.

b. Infusum Krameriæ.

Rhatany root, in No. 40 powder, 1
Boiling distilled water, 20.
} Infuse half an hour, and strain.

c. Tinctura Krameriæ.

Rhatany root, in No. 40 powder, ℥ 2½
Proof spirit, O 1.
} Made by maceration for 48 hours, and percolation.

ACTION.—Krameria is a valuable **astringent,** chiefly employed for its effects on the throat and alimentary canal.

Doses—Of Extract, gr. 5 to 20; Infusion, fl ℥ 1 to 2; Tincture, fl ʒ ½ to 2.

15. PAREIRÆ RADIX—PAREIRA ROOT.—The dried root.

DESCRIPTION.—*a.* In long nearly cylindrical more or less twisted pieces, from ¾ inch to 2 or more inches thick.

b. Covered with a thin blackish-brown bark, and marked externally with longitudinal furrows, and transverse ridges and fissures.

c. Internally yellowish- or brownish-grey, with well-marked concentric or more or less eccentric circles of porous wood, separated into wedge-shaped portions by large medullary rays, and when cut presenting a waxy appearance.

d. No odour; taste bitter.

PHARMACY.—1. *Officinal Preparations:*—

a. Decoctum Pareiræ.—

Pareira root, in No. 20 powder, ℥ 1¼
Distilled water, fl ℥ 20. } Boil 15 minutes, strain, and make up to O 1.

b. Extractum Pareiræ.—Made by digesting pareira root, in No. 40 powder, with boiling water; percolating; and evaporating by a water-bath.

c. Extractum Pareiræ Liquidum.—Dissolve Extract of Pareira, 4, in a sufficient quantity of a mixture of { Rectified spirit, 1 / Distilled water, 3 } to form 16 fluid parts.

2. *Incompatibles.*—Solution of iodine turns the cold decoction inky bluish-black.

ACTION.—Pareira is a slight **bitter tonic,** but is chiefly employed as a **diuretic,** and for a supposed **specific** effect upon the mucous membrane of the urinary tract.

Doses—Of Decoction, fl ℥ 1 to 2; Extract, gr. 10 to 20; Liquid Extract, fl ʒ ½ to 2.

16. PODOPHYLLI RHIZOMA—PODOPHYLLUM RHIZOME.—The dried rhizome and rootlets.

DESCRIPTION.—*a.* In pieces of variable length, and from about ⅕ to ⅓ of an inch thick.

b. Flattened-cylindrical; presenting at varying intervals large irregular tuberosities, which are marked above by a depressed circular scar, and giving off below a variable number of very brittle brownish rootlets, or, if these are broken off, presenting a corresponding number of whitish scars.

c. Dark reddish-brown or reddish-yellow; smooth or somewhat wrinkled.

d. Breaks with a short fracture, and internally is whitish and mealy.

e. Odour faintly narcotic; taste bitterish, acrid, and nauseous.

PHARMACY.—Podophyllum rhizome is not used itself therapeutically, but is merely introduced into the B.P. as the source of the resin. (*See* RESINS).

17. PYRETHRI RADIX — PELLITORY ROOT. — The dried root.

DESCRIPTION.—*a.* In unbranched pieces, from 2 to 4 inches long, and $\frac{1}{2}$ to $\frac{3}{4}$ of an inch thick, cylindrical or somewhat tapering.

b. Covered by a thickish brown shrivelled bark, studded by dark-coloured receptacles of resin.

c. Breaks with a close fracture, the fractured surface presenting a radiated appearance.

d. Inodorous; but when chewed causes a burning and pricking sensation over the whole mouth and throat.

PHARMACY.—*Officinal Preparation:*—

Tinctura Pyrethri.

Pellitory root, in No. 40 powder, 4 Rectified spirit, 20.	Made by maceration for 48 hours, and percolation.

ACTION.—Pyrethrum is merely used as a **sialagogue.** The tincture is made into a mouth-wash.

18. RHEUM—RHUBARB.—The root, more or less deprived of its bark, sliced and dried. Collected and prepared in China and Thibet. (Several varieties of rhubarb are described, but the B.P. only gives this general direction, and does not recognise them individually).

DESCRIPTION.—*a.* In somewhat cylindrical, barrel-shaped, conical, plano-convex, or irregularly-formed pieces. Frequently bored with a hole which contains the remains of the cord used to suspend them to dry, or the cord has been removed.

b. Outer surface covered with a bright yellowish-brown powder, rounded or somewhat angular, smooth or more or less wrinkled, and marked beneath the powder with reddish-brown or dark rusty-brown lines, intermixed in a yellowish-brown substance, and frequently presenting small scattered star-like spots.

c. Fracture hard, compact, uneven, presenting a marbled appearance, and in some cases exhibiting a ring of star-like spots.

d. Odour peculiar and somewhat aromatic; taste bitter, feebly astringent, and when chewed it feels gritty between the teeth.

PHARMACY.—*Officinal Preparations :—*

a. Extractum Rhei.—Made with distilled water and proof spirit, from the powdered root.

b. Infusum Rhei.

Rhubarb root, in thin slices, ℥ 1¼
Boiling distilled water, fl ℥ 10.
} Infuse for half an hour, and strain.

c. Pilula Rhei Composita.

Rhubarb, ℥ 3
Socotrine aloes, ℥ 2¼
Myrrh, ℥ 1½
Hard soap, ℥ 1½
Oil of peppermint, fl ℥ 1½
Glycerine, ℥ 1
Treacle, about ℥ 3.
} Mix the powders with the oil and soap; add the glycerine and sufficient treacle; and beat into a uniform mass.

d. Pulvis Rhei Compositus—Gregory's Powder.

Rhubarb, in powder, 2
Light magnesia, 6
Ginger, in powder, 1.
} Mix thoroughly, pass through a fine sieve, and rub lightly in a mortar.

If a more condensed powder be desired, heavy magnesia may be employed.

e. Syrupus Rhei.—Sp. gr. about 1·310.

Rhubarb, in No. 20 powder } of each, 2
Coriander, in No. 20 powder }
Refined sugar, 24
Rectified spirit, 8
Distilled water, 24

Percolate the rhubarb and coriander slowly with the spirit and water previously mixed. Evaporate to fl ℥ 14; filter, and dissolve the sugar with the aid of heat.

f. Tinctura Rhei.

Rhubarb, in No. 20 powder, 2
Cardamom seeds, bruised, ¼
Coriander, bruised, ¼
Saffron, ¼
Proof spirit, 20.

Prepared by maceration for 48 hours, and percolation.

g. Vinum Rhei.

Rhubarb, in course powder, ℥ 1½
Canella bark, in coarse powder, gr. 60
Sherry, O 1

Macerate for 7 days; strain, press, filter; and make up with sherry to O 1.

Action.—Rhubarb in small doses is a **gastric tonic,** and **astringent** to the alimentary canal. In larger doses it acts as a **purgative** and **hepatic stimulant,** but after its purgative action it produces an astringent effect.

Doses—Of Rhubarb, gr. 5 to 20; Extract, gr. 5 to 15; Infusion, fl ℥ 1 to 2; Compound Pill, gr. 5 to 10; Compound Powder, gr. 20 to 60; Syrup, fl ℥ 1 to 4; Tincture, as stomachic, fl ℥ 1 to 2, as purgative, fl ℥ 4 to 8; Wine, fl ℥ 1 to 2.

19. Sarsæ Radix—Jamaica Sarsaparilla.—The dried root.

Description.—*a.* Six or more feet in length, usually bent or folded and packed together into bundles of about 18 inches long, and 4 to 5 inches

in diameter, the whole bound together by a long root of the same drug.

b. Roots more or less furrowed, varying in thickness, but not exceeding that of a goose-quill, with numerous branched rootlets.

c. Colour greyish-brown to deep reddish-brown.

d. Inodorous; taste mucilaginous, and when chewed feebly bitter and faintly acrid.

PHARMACY.—*Officinal Preparations:*—

a. Decoctum Sarsæ.

Sarsaparilla, cut transversely, ℥ 2½
Boiling distilled water, O 1½.
} Digest 2 hours; boil 10 minutes; cool; strain; and make up to O 1.

b. Decoctum Sarsæ Compositum.

Sarsaparilla, cut transversely, ℥ 2½
Sassafras root, in chips,
Guaiacum wood turnings,
Dried liquorice root, bruised,
} of each ℥ 1¼
Mezereon bark, ℥ ⅛
Boiling distilled water, fl ℥ 30.
} Made as above; make up to ℥ 20.

c. Extractum Sarsæ Liquidum.—An *alcoholic extract*, made with proof spirit, sugar, and water.

ACTION.—Sarsaparilla is a **stomachic tonic,** but is chiefly used as an **alterative.**

Doses—Of either Decoction, fl ℥ 2 to 10; Liquid Extract, fl ℥ 2 to 4.

20. SASSAFRAS RADIX—SASSAFRAS ROOT.—The dried root, reduced to chips or shavings.

DESCRIPTION.—*a.* In large branched pieces more or less covered with bark.

b. Bark rough and greyish-brown or rusty-brown externally; internally smooth, glistening, and rusty-brown.

c. Wood soft, light in weight, greyish-yellow or greyish-red.

d. Agreeable aromatic odour; taste peculiar, aromatic, and somewhat astringent; odour and taste more marked in the bark.

PHARMACY.—There are no officinal preparations of sassafras, but it is contained in Decoctum Sarsæ Compositum.

ACTION.—Sassafras is supposed to be an **alterative.**

21. SCAMMONIÆ RADIX — SCAMMONY ROOT.—The dried root.

DESCRIPTION.—*a.* Unbranched, of varying lengths and sizes, cylindrical except at its upper end, where it is enlarged, and presents usually some remains of the slender aërial stems.

b. More or less shrivelled, longitudinally furrowed.

c. Greyish-brown or yellowish externally; pale-brown or whitish within, and when fractured small fragments of pale yellowish-brown resin may often be seen on the surface of the fracture.

d. Odour and taste faint, somewhat resembling jalap.

PHARMACY.—Scammony root is introduced into the B.P. as the source of *Scammony* and *Scammony Resin*, the former being obtained from the *living root*, the latter from the *dried root*. (*See* GUM-RESINS and RESINS).

22. SENEGÆ RADIX—SENEGA ROOT.—The dried root.

DESCRIPTION. — *a.* Enlarged at the upper end into an irregular knotty tuberosity, which bears the remains of numerous small stems, and tapering below into a more or less twisted or curved, branched, and usually *keeled* root, from $\frac{1}{5}$ to more than $\frac{1}{3}$ of an inch thick.

b. Bark yellowish- or brownish-grey, transversely cracked, horny, translucent; enclosing an

irregular whitish central woody column. Fracture short, brittle.

c. Odour of bark peculiar, rancid; taste at first sweetish, but afterwards very acrid, sourish, and causing a flow of saliva. Wood tasteless and inodorous.

PHARMACY.—*Officinal Preparations:*—

a. Infusum Senegæ.

Senega root, in No. 20 powder, ℥ ½
Boiling distilled water, fl ℥ 10.
} Infuse 1 hour, and strain.

b. Tinctura Senegæ.

Senega root, in No. 40 powder, ℥ 2½
Proof spirit, O 1.
} Made by maceration for 48 hours, and percolation.

ACTION.—Senega is employed as a **stimulant expectorant** and **cardiac tonic.** In large doses it acts as an **irritant** to the alimentary canal, causing vomiting and purging.

Doses—Of Infusion, fl ℥ 1 to 2; Tincture, fl ℥ ½ to 2.

23. SERPENTARIÆ RHIZOMA — SERPENTARY RHIZOME.—The dried rhizome and rootlets.

DESCRIPTION.—*a.* Rhizome twisted, about 1 inch long, and ⅛ of an inch in diameter.

b. Marked above by the remains of former stems, and giving off below an interlacing tuft of numerous slender branched rootlets, of from 2 to 4 inches long.

c. Dull yellowish-brown colour.

d. Odour aromatic, peculiar, camphoraceous; taste bitterish, aromatic, and somewhat camphoraceous.

(The rhizome of *Aristolochia reticulata* is a little thicker; and the rootlets are longer, coarser, and less matted together).

PHARMACY.—1. *Officinal Preparations :—*

a. Infusum Serpentariæ.

Serpentary rhizome, in No. 20 powder, ℥ ¼
Boiling distilled water, fl ℥ 10.
} Infuse half an hour, and strain.

b. Tinctura Serpentariæ.

Serpentary rhizome, in No. 40 powder, ℥ 2½
Proof spirit, O 1.
} Made by maceration for 48 hours, and percolation.

2. Serpentary is an ingredient in Tinctura Cinchonæ Composita.

ACTION.—Serpentary is regarded as a **gastric stimulant** and **tonic, general stimulant, diaphoretic,** and **alterative.**

Doses—Of Infusion, fl ℥ 1 to 2; Tincture, fl ʒ ½ to 2.

24. SUMBUL RADIX — SUMBUL or MUSK ROOT.—Dried transverse sections of the root.

DESCRIPTION. — *a.* Varying much in size, but usually from about 1 to 3 inches in diameter, and from ¾ to more than 1 inch in thickness.

b. Externally covered with a papery bark, dusky-brown, transversely wrinkled, and sometimes beset with short bristly fibres.

c. Internally spongy, coarsely fibrous, dry, farinaceous, and dirty yellowish-brown, mottled with whitish patches, and spots of exuded resin.

d. Strong musk-like odour; taste bitter and aromatic.

PHARMACY.—*Officinal Preparation :—*

Tinctura Sumbul.

Sumbul root, in No. 40 powder, ℥ 2½
Rectified spirit, O 1.
} Made by maceration for 48 hours, and percolation.

ACTION.—Sumbul is a **carminative, antispasmodic, nervine** and **cardiac stimulant.**

Dose—Of Tincture, ♏ 10 to 30.

25. Taraxaci Radix — Dandelion Root.—The fresh and dried roots, collected in the autumn from indigenous plants.

Description.—*a.* When fresh frequently a foot or more in length, and half an inch or more in diameter; smooth. When dried it is more or less shrivelled, deeply furrowed longitudinally.

b. The fresh root is yellowish-brown externally; the dried root dark-brown or blackish.

c. The fresh root breaks readily with a short fracture, and a milky juice exudes, the fractured surface being whitish, and presenting faint concentric rings. The dried root also breaks with a short fracture, and the exposed surface shows a yellow porous central woody axis, surrounded by a thick whitish bark, with a variable number of irregular well-marked concentric rings.

d. Inodorous; taste bitter.

Pharmacy.—*Officinal Preparations:*—

a. Decoctum Taraxaci.

Dried dandelion root, sliced and bruised, ℥ i
Distilled water, O i.
} Boil for 10 minutes, strain, and make up to O i.

b. Extractum Taraxaci.—Made by pressing out the juice from the fresh dandelion root; heating it to 212° for 10 minutes; straining; and evaporating by a water-bath under 160°.

c. Extractum Taraxaci Liquidum.—Made by macerating dried dandelion root, in No. 20 powder, with proof spirit and distilled water successively; mixing the liquids; evaporating by the water-bath; and making up to a certain quantity by adding distilled water.

d. Succus Taraxaci.—Made by pressing out the juice from the fresh root; adding rectified spirit (1 to 3); setting aside for 7 days; and filtering.

Action.—Taraxacum is a **bitter stomachic tonic** and **laxative.** It is only a slight **hepatic stimulant,** although it has considerable reputation in the treatment of affections of the liver.

Doses—Of Decoction, fl ʒ 2 to 4 ; Extract, gr. 5 to 30; Liquid Extract, fl ʒ 1¼ to 2 ; Juice, fl ʒ 1 to 2.

26. Valerianæ Rhizoma—Valerian Rhizome.—The dried rhizome and rootlets, collected in autumn from plants growing wild or cultivated in Britain.

Description.—*a.* A short erect rhizome, entire or sliced, and giving off numerous slender brittle shrivelled rootlets, 3 or 4 inches long.

b. Colour dark yellowish-brown externally, whitish internally.

c. Odour developed in the process of drying, strong, peculiar, disagreeable; taste unpleasant, camphoraceous and slightly bitter.

d. Yields volatile oil and valerianic acid when distilled with water.

Pharmacy.—*Officinal Preparations :—*

a. Infusum Valerianæ.

Valerian rhizome, bruised, ʒ 1¼
Boiling distilled water, fl ʒ 10.
} Infuse for one hour, and strain.

b. Tinctura Valerianæ.

Valerian rhizome, in No. 40 powder, ʒ 2½
Proof spirit, O 1
} .

Made by maceration for 48 hours, and percolation.

c. Tinctura Valerianæ Ammoniata.

Valerian rhizome, in No. 40 powder, ʒ 2½
Aromatic spirit of ammonia, O 1.
} Macerate for 7 days; strain, press, filter; make up to O 1.

ACTION.—Valerian is a valuable **carminative, antispasmodic,** and **nervine stimulant.**

Doses—Of Infusion, fl ℥ i to 2; Tincture, fl ʒ i to 2; Ammoniated Tincture, fl ʒ ½ to 1.

27. VERATRI VIRIDIS RHIZOMA—GREEN HELLEBORE RHIZOME.—The dried rhizome and rootlets.

DESCRIPTION.—*a.* Rhizome is entire or transversely or longitudinally sliced or divided, and either with or without attached rootlets.

b. When entire is from 1 to 2 inches or more in length, and ¾ of an inch or more in diameter; erect, obconical, obtuse or truncated at the apex.

c. Colour dark-brown externally, whitish within.

d. Frequently bears at its upper end the concentrically arranged remains of leaves, and gives off on all sides numerous much-shrivelled yellowish-white rootlets, several inches long; or the latter are detached and mixed with it, in which case the rhizome is marked with corresponding scars.

e. Inodorous, but exciting sneezing when powdered; taste bitterish and very acrid.

PHARMACY.—*Officinal Preparation:*—

Tinctura Veratri Viridis.

Green hellebore rhizome, in No. 40 powder, ℥ 4 Rectified spirit, O 1.	Made by maceration for 48 hours, and percolation.

ACTION.—Green hellebore is used as a **vascular depressant** and **antipyretic.** It increases most secretions. In large doses it is a powerful **irritant** to the alimentary canal, and a **general depressant.**

Dose—Of Tincture, ♏ 5 to 20.

28. ZINGIBER—GINGER.—The scraped and dried rhizome.

DESCRIPTION.—*a.* In flattish, irregularly-branched pieces; each branch marked at its summit by a depressed scar.

b. Varying in length, but commonly from 3 to 4 inches.

c. Externally pale-buff and somewhat striated and fibrous; breaking readily with a mealy, short, but rather fibrous fracture.

d. Agreeable aromatic odour; strong and pungent taste.

PHARMACY.—1. *Officinal Preparations:*—

a. Tinctura Zingiberis.

Ginger, in powder, ℥ 2½
Rectified spirit, O 1.
} Made by maceration for 48 hours, and percolation.

b. Tinctura Zingiberis Fortior.

Ginger, in fine powder, ℥ 10
Rectified spirit, a sufficiency.
} Percolate O1.

c. Syrupus Zingiberis.

Strong tincture of ginger, fl ʒ 6
Syrup, fl ℥ 19.
} Mix with agitation.

2. Ginger is an ingredient in several Compound Powders, Confections of Opium and Scammony, Infusion of Senna, Compound Squill Pill, and Wine of Rhubarb.

ACTION.—Ginger is a **gastric stimulant** and **carminative.**

Doses—Of Ginger, gr. 10 to 20; Tincture, ♏ 15 to 60; Stronger Tincture, ♏ 5 to 20; Syrup, fl ʒ 1.

Group III.—BARKS.

In the following list only the *true barks* are considered, namely, those which form the outer covering of the stem or branches of a plant.

Name.	Source.	Natural Order.
1. Canellæ Albæ Cortex.	Canella Alba.	Canellaceæ.
2. Cascarillæ Cortex.	Croton Eluteria.	Euphorbiaceæ.
3. Cinchonæ Cortex.	Cinchona Calisaya, Officinalis, Succirubra, Lancifolia, etc.	Cinchonaceæ.
4. Cinchonæ Rubræ Cortex.	Cinchona Succirubra.	
5. Cinnamomi Cortex.	Cinnamomum Zeylanicum.	Lauraceæ.
6. Cuspariæ Cortex.	Galipea Cusparia.	Rutaceæ.
7. Laricis Cortex.	Pinus Larix.	Coniferæ.
8. Mezerei Cortex.	Daphne Mezereum and Laureola.	Thymelaceæ.
9. Nectandræ Cortex.	Nectandra Rodiæi.	Lauraceæ.
10. Quercus Cortex.	Quercus Robur.	Cupuliferæ.
11. Rhamni Frangulæ Cortex.	Rhamnus Frangula.	Rhamnaceæ.
12. Rhamni Purshiani Cortex.	Rhamnus Purshianus.	Rhamnaceæ.

1. Canellæ Albæ Cortex—Canella Bark.—The dried bark.

Description.—*a.* In quills or irregular pieces, which are generally more or less twisted and broken longitudinally.

b. Externally pale orange-brown or buff colour, and commonly marked by roundish depressions or scars, and sometimes the remains of the corky layer may be seen here and there as silvery-grey patches; internally whitish or yellowish-white.

c. Agreeable odour, somewhat resembling a mixture of cloves and cinnamon; taste pungent, bitter, and acrid.

PHARMACY.—Canella has no officinal preparations. It is contained in Vinum Rhei.

ACTION.—Canella is a **bitter aromatic,** and is given as a **stomachic tonic.**

2. CASCARILLÆ CORTEX—CASCARILLA BARK.—The dried bark.

DESCRIPTION.—*a.* In quills; from 1 to 3 or more inches in length, from $\frac{1}{6}$ to $\frac{1}{2}$ an inch in diameter.

b. Covered with a dull-brown easily separable corky layer, which is more or less coated with a silvery- or greyish-white lichen.

c. Fracture brown, short, and resinous.

d. Odour agreeable and aromatic, especially when burned; taste warm and nauseously bitter.

PHARMACY.—1. *Officinal Preparations:*—

a. Infusum Cascarillæ.

Cascarilla bark, in No. 20 powder, ℥ 1
Boiling distilled water, fl ℥ 10.
} Infuse half an hour, and strain.

b. Tinctura Cascarillæ.

Cascarilla bark, in No. 40 powder, ℥ 2½
Proof spirit, O 1.
}

Made by maceration for 48 hours, and percolation.

2. *Incompatibles.*—Lime-water; metallic salts; mineral acids.

ACTION.—Cascarilla is an **aromatic bitter,** and is chiefly employed as a **stomachic tonic.** It is also believed to be an **antiperiodic,** and **stimulant expectorant.**

Doses—Of Infusion, fl ℥ 1 to 2; Tincture, fl ℥ ½ to 2.

3. CINCHONÆ CORTEX—CINCHONA BARK.—The dried bark. No description is given in the B.P. of the varieties of cinchona bark included in this group, from which the peculiar alkaloids of the

bark may be obtained, namely, Sulphate of Cinchonidine, Sulphate of Cinchonine, Hydrochlorate and Sulphate of Quinine.

4. Cinchonæ Rubræ Cortex — Red Cinchona Bark.—The dried bark.

Description.—*a.* In quills or more or less incurved pieces, varying in length from usually a few inches to a foot or more, the bark itself being from about $\frac{1}{10}$ to $\frac{1}{4}$ of an inch thick.

b. Coated with the periderm; outer surface more or less rough from longitudinal furrows and ridges, or transverse cracks, annular fissures, and warts, and brownish or reddish-brown in colour; inner surface brownish-red or deep reddish-brown, irregularly and coarsely striated.

c. Fracture nearly close in the smaller quills, finely fibrous in the larger ones.

d. Powder brownish or reddish-brown.

e. Taste bitter and somewhat astringent; no marked odour.

Tests.—The B.P. states with regard to this bark, that "when used for purposes other than that of obtaining the alkaloids or their salts, it should yield from 5 to 6 per cent. of total alkaloids, of which not less than half should consist of quinine and cinchonidine." Methods are given for estimating the amount of alkaloids. (See *British Pharmacopœia*, p. 111).

Pharmacy.—1. *Officinal Preparations:*—

a. Decoctum Cinchonæ.

Red cinchona bark, in No. 20 powder, ℥ 1¼
Distilled water, O 1.
} Boil 10 minutes; strain; when cold make up to O 1.

b. Extractum Cinchonæ Liquidum.—Made by macerating for 48 hours Cinchona bark, in No. 60 powder, ℥ 20, with a mixture of Distilled water,

O 5, Hydrochloric acid, fl ʒ 5, and Glycerine, fl ℥ 2½, stirring frequently; exhausting the bark by percolation with water; evaporating to fl ℥ 20; standardising this liquid so that it shall contain 5 grains of alkaloids in every 100 fluid-grains, with 12·5 grains of rectified spirit. (*See* B.P. for details).

c. Infusum Cinchonæ Acidum.

Red cinchona bark, in No. 40 powder, ℥ ½ Aromatic sulphuric acid, fl ʒ 1 Boiling distilled water, fl ℥ 10.	Infuse for one hour, and strain.

d. Tinctura Cinchonæ.

Red cinchona bark, in No. 40 powder, ℥ 4 Proof spirit, O 4.	Made by maceration for 48 hours, and percolation.

e. Tinctura Cinchonæ Composita.

Red cinchona bark, in No. 40 powder, ℥ 2 Bitter-orange peel, cut small and bruised, ℥ 1 Serpentary rhizome, bruised, ℥ ½ Saffron, gr. 55 Cochineal, in powder, gr. 28 Proof spirit, O 1.	Made by maceration for 48 hours, and percolation.

2. Red cinchona bark is contained in Mistura Ferri Aromatica.

Action.—The preparations of cinchona bark are chiefly employed as **stomachic** and **general tonics,** having also an **astringent** effect. They may be used as **antiperiodics** when the alkaloids cannot be obtained.

Doses—Of Decoction, fl ℥ 1 to 2; Liquid Extract, ♏ 5 to 10; Infusion, fl ʒ 1 to 2; either Tincture, fl ʒ ½ to 2.

5. Cinnamomi Cortex — Cinnamon Bark.—The dried inner bark of shoots from the truncated stocks or stools of the cultivated cinnamon tree.

Description.—*a.* In closely rolled quills, each about $\frac{3}{8}$ of an inch in diameter, and containing several smaller quills.

b. Thin, brittle, splintery, and moderately pliable.

c. Dull light yellowish-brown externally, and marked by little scars or holes, and faint shining wavy lines; darker brown on its inner surface.

d. Peculiar fragrant odour; sweet, warm, and aromatic taste.

Pharmacy.—1. *Officinal Preparations:—*

a. Aqua Cinnamomi.

Cinnamon bark, bruised, ℥ 20
Water, C 2.
} Distil C 1.

b. Oleum Cinnamomi. (*See* Oils).

c. Pulvis Cinnamomi Compositus.

Cinnamon
Cardamom seeds
Ginger.
} Mix equal parts in powder.

d. Tinctura Cinnamomi.

Cinnamon bark, in coarse powder, ℥ $2\frac{1}{2}$
Rectified spirit, O 1.
} Made by maceration for 48 hours, and percolation.

2. *Cinnamon* is an ingredient in Decoctum Hæmatoxyli, Infusum Catechu, Pulvis Catechu Compositus, Pulvis Cretæ Aromaticus cum Opio, Pulvis Kino Compositus, Tinctura Cardamomi Composita, Tinctura Lavandulæ Composita, and Vinum Opii.

Aqua Cinnamomi is contained in Mistura Cretæ, Mistura Guaiaci, and Mistura Spiritus Vini Gallici.

Oleum Cinnamomi is an ingredient in Spiritus Cinnamomi.

Action.—Cinnamon is much used as a flavouring agent. Medicinally it acts as a **carminative** and **astringent.**

Doses—Of Cinnamon Water, fl ℥ i to 2; Compound Powder, gr. 3 to 10; Tincture, fl ʒ ½ to 2.

6. Cusparіæ Cortex—Cusparia or Angustura Bark.—The dried bark.

Description.—*a.* In flattish or curved pieces, or in quills, 6 inches or more in length; the bark itself commonly not more than ⅙ of an inch thick, and *obliquely cut on its inner edge.*

b. Coated externally with a yellowish-grey mottled corky layer, which may be usually scraped off by the nail, the exposed surface presenting a dark-brown resinous appearance; inner surface light brown, flaky, and occasionally with strips of wood attached.

c. Fracture short and resinous, and exhibiting, especially to the magnifying lens, numerous white points or lines.

d. Odour musty and disagreeable; taste bitter and somewhat aromatic.

e. The fractured surface touched with nitric acid does not become of an arterial blood-red colour. (This distinguishes cusparia bark from the bark of Strychnos Nux Vomica—False Angustura Bark).

Pharmacy.—1. *Officinal Preparation:*—

Infusum Cusparіæ.

Cusparia bark, in No. 40 powder, ℥ ½ Distilled water at 120°, fl ℥ 10.	Infuse half an hour, and strain.

2. *Incompatibles.*—Mineral acids; perchloride of iron; metallic salts.

Action.—Cusparia is an **aromatic bitter,** and is used as a **stomachic tonic.** It is also believed to be somewhat **antiperiodic.**

Dose—Of Infusion, fl ℥ i to 2.

7. Laricis Cortex—Larch Bark.—The bark, collected in spring, deprived of its outer rough portion, and dried.

Description.—*a.* In flattish pieces or quills of varying lengths and sizes.

b. Outer surface dark-red or rosy, and somewhat uneven; inner surface nearly smooth, and yellowish-white or pinkish-red according to age.

c. Fracture close, except the liber, which is somewhat fibrous, and the fractured surfaces, except internally, are of a deep carmine-red colour.

d. Odour slightly balsamic and terebinthinate; taste astringent.

Pharmacy.—*Officinal Preparation :—*

Tinctura Laricis.

Larch bark, in No. 40 powder, ℥ 2½
Rectified spirit, O 1.
} Made by maceration for 48 hours, and percolation.

Action.—Larch bark is a **stimulant expectorant** and **astringent.**

Dose—Of Tincture, ♏ 20 to 30.

8. Mezerei Cortex—Mezereon Bark.—The dried bark.

Description.—*a.* In long thin more or less flattened strips, which are commonly folded or rolled into disks; or in small quills of various lengths.

b. Covered externally by an olive-brown or somewhat reddish-brown, readily separable, corky layer; inner surface whitish, silky, and very tough.

c. No marked odour; taste burning and acrid.

Pharmacy.—1. *Officinal Preparation :—*

Extractum Mezerei Æthereum.—Made with rectified spirit and ether. An ingredient in Linimentum Sinapis Compositum.

2. Mezereon bark is contained in Decoctum Sarsæ Compositum.

ACTION.—Mezereon applied externally is a **rubefacient** or **vesicant.** Internally it is supposed to act as an **alterative.**

9. NECTANDRÆ CORTEX—BEBEERU BARK.—The dried bark.

DESCRIPTION.—*a.* In flattish heavy pieces, from 1 to 2 feet long, 2 to 6 inches broad, $\frac{1}{4}$ of an inch or more thick.

b. Very hard and brittle, and the fractured surface presents a coarse-grained appearance.

c. Externally greyish-brown; internally dark-cinnamon-brown, and with evident longitudinal striæ.

d. Taste strongly bitter and astringent; inodorous.

PHARMACY.—Bebeeru bark has no officinal preparations, but it is the source of *Sulphate of Bebeerine.* (*See* ALKALOIDS).

ACTION.—Bebeeru bark is a **tonic** and **antiperiodic.**

10. QUERCUS CORTEX—OAK BARK.—The dried bark of the smaller branches and young stems, collected in spring.

DESCRIPTION.—*a.* In quills of variable length.

b. Covered externally with a corky layer, smooth, shining, silvery or ash-grey, variegated with brown; internally cinnamon-brown or brownish-red, and longitudinally striated.

c. Fracture tough and fibrous.

d. Taste very astringent; no marked odour.

PHARMACY.—1. *Officinal Preparation:—*

Decoctum Quercus.

Oak-bark, bruised, ℥ 1¼ Distilled water, O 1.	Boil 10 minutes, strain, and make up to O 1.

2. *Incompatibles.*—Mineral acids; alkalies; metallic salts; gelatine; and alkaloids.

Action.—The decoction of oak-bark is used as a **local astringent.**

11. Rhamni Frangulæ Cortex—Frangula Bark.—The dried bark. Collected from the young trunk and moderate-sized branches, and kept at least one year before being used.

Description.—*a.* In small quills, the bark itself being about $\frac{1}{25}$ of an inch or somewhat more in thickness.

b. Covered externally with a greyish-brown or blackish-brown corky layer, marked with transverse whitish lenticels; inner surface smooth, brownish-yellow.

c. Fracture short and purplish externally, somewhat fibrous and yellowish within.

d. No marked odour; taste pleasant, sweetish, and slightly bitter.

Pharmacy.—*Officinal Preparations:*—

a. Extractum Rhamni Frangulæ.—Made by maceration and percolation of frangula bark, in No. 40 powder, with proof spirit and water, and evaporation to a suitable consistence.

b. Extractum Rhamni Frangulæ Liquidum.—Made by boiling the bark in coarse powder with distilled water; evaporating; adding rectified spirit when cold; filtering after standing for some hours; and making up to a certain volume with distilled water.

Action.—This drug is an agreeable and mild **aperient,** especially suitable for children, and chiefly employed in habitual constipation.

Doses—Of Extract, gr. 15 to 60; Liquid Extract, fl 3 1 to 4.

12. Rhamni Purshiani Cortex—Cascara Sagrada —Sacred Bark.—The dried bark.

Description.—*a.* In quills or incurved pieces of various lengths and sizes, the bark itself being from about $\frac{1}{25}$ to $\frac{1}{8}$ of an inch thick.

b. Externally smooth or nearly so, covered with a greyish-white layer, which is usually easily removed, and frequently marked with spots or patches of adherent lichens. Beneath the surface it is violet-brown, reddish-brown, or brownish; and internally reddish-brown or yellowish-brown, and nearly smooth, although somewhat striated longitudinally.

c. Fracture short, except internally, where it is slightly fibrous, more especially in the larger pieces.

d. No marked odour; taste bitter.

(This drug is frequently imported in flattened packets, consisting of small pieces of the bark compressed into a more or less compact mass).

Pharmacy.—*Officinal Preparations:*—

a. Extractum Cascaræ Sagradæ.—Made by maceration and percolation of the bark, in No. 40 powder, with proof spirit and distilled water; and evaporation to a suitable consistence.

b. Extractum Cascaræ Sagradæ Liquidum.—Made by boiling the bark in coarse powder with water; evaporating; adding rectified spirit when cold; filtering after standing some hours; and making up to a certain volume with distilled water.

Action.—In small doses cascara sagrada is a **stomachic tonic,** but it is almost entirely used as an **aperient,** in cases of habitual constipation, being more efficient and certain than the frangula bark. In full doses it tends to act rather powerfully.

Doses—Of Extract, gr. 2 to 8; Liquid Extract, fl ʒ ½ to 2.

Group IV.—WOODS OR STEMS.

Name.	Source.	Natural Order.
1. Guaiaci Lignum.	Guaiacum Officinale and Sanctum.	*Zygophyllaceæ.*
2. Hæmatoxyli Lignum.	Hæmatoxylon Campechianum.	Leguminosæ.
3. Pterocarpi Lignum.	Pterocarpus Santalinus.	Leguminosæ.
4. Quassiæ Lignum.	Picræna Excelsa.	Simarubaceæ.

1. Guaiaci Lignum — Guaiacum Wood. — The heart-wood. For use in pharmacy, the wood as usually imported should be deprived of its sap-wood, and the heart-wood reduced to the form of chips, raspings, or shavings.

Description and Tests. — *a.* The chips, raspings, or shavings are dark greenish-brown.

b. Taste, when chewed for a short time, is acrid and somewhat aromatic; odour, when rubbed, and more especially when heated, agreeable and faintly aromatic.

c. When touched with nitric acid, the chips assume a temporary bluish-green tinge; and if moderately heated in a solution of perchloride of mercury, a bluish-green colour is also produced.

Pharmacy.—Guaiacum wood is the source of guaiacum resin (*see* Resins); and is an ingredient in Decoctum Sarsæ Compositum.

Action.—Guaiacum wood is merely used as an **alterative,** in the compound decoction of sarsaparilla.

2. Hæmatoxyli Lignum—Logwood.—The sliced heart-wood.

Description.—*a.* The logs are hard, heavy, blackish-red externally, and internally reddish-brown.

b. The chips are reddish-brown. (They often present a greenish or greenish-yellow lustre).

c. Odour slight, peculiar, and agreeable; taste sweetish, astringent. When chewed the saliva is coloured a brilliant dark reddish-pink.

PHARMACY.—1. *Officinal Preparations:*—

a. *Decoctum Hæmatoxyli.*

Logwood, in chips, ʒ 1
Cinnamon bark, bruised, gr. 55
Distilled water, O 1
} Boil for 10 minutes; strain; and make up to O1.

b. *Extractum Hæmatoxyli.*—Made by infusing logwood, in fine chips, for 24 hours in boiling water; boiling; straining; and evaporating to dryness by a water-bath.

2. *Incompatibles.*—Mineral acids; metallic salts; lime-water; tartarated antimony.

ACTION.—Logwood is an **astringent,** chiefly used for the alimentary canal.

Doses—Of Decoction, fl ʒ 1 to 2; of Extract, gr. 10 to 30.

3. PTEROCARPI LIGNUM—RED SANDAL-WOOD.—The sliced or rasped heart-wood.

DESCRIPTION.—*a*. The logs are dense, heavy, irregular; varying in length and thickness; dark reddish-brown or blackish-brown externally; and internally, if cut transversely, deep blood-red, variegated with zones of a lighter red colour.

b. Usually in the form of raspings or small chips, of deep reddish-brown colour.

c. Taste very slightly astringent; faint peculiar odour when rubbed.

PHARMACY.—Red sandal-wood is an ingredient in Tinctura Lavandulæ Composita.

ACTION.—Red sandal-wood is mainly used as a colouring agent. It is somewhat **astringent.**

4. Quassiæ Lignum—Quassia Wood.—The chips, raspings, or shavings of the wood.

Description.—*a.* The billets or logs vary in length and size, being frequently as thick as a man's thigh.

b. Externally covered by a dark-grey bark.

c. The wood is dense, tough, porous, and of a pale yellowish-white colour.

d. The chips, shavings, or raspings of the wood are inodorous; but have an intense and purely bitter taste.

e. An infusion does not become black or bluish-black on the addition of a persalt of iron.

Pharmacy.—*Officinal Preparations:*—

a. Extractum Quassiæ.—Made with *cold water*, by maceration, percolation, and evaporation to a suitable consistence.

b. Infusum Quassiæ.

Quassia wood, in chips, gr. 55 } Macerate for ½ an
Cold distilled water, fl ℥ 10. } hour, and strain.

c. Tinctura Quassiæ.

Quassia wood, in chips, ℥ ¾ } Macerate 7 days,
Proof spirit, O 1. } with occasional agitation; strain, press, and filter; make up with proof spirit to O 1.

Action.—Quassia is a pure **bitter stomachic tonic.** As an enema it is employed as a **vermicide** for thread-worms. In large doses it affects the nervous system.

Doses—Of Extract, gr. 3 to 5; Infusion, fl ℥ 1 to 2; Tincture, fl ℥ ½ to 2.

Group V.—GREEN TOPS AND TWIGS.

Name.	Source.	Natural Order.
Sabinæ Cacumina—Savin Tops.	Juniperus Sabina.	Coniferæ.
Scoparii Cacumina—Broom Tops.	Cytisus Scoparius.	Leguminosæ.

1. Sabinæ Cacumina—Savin Tops.—The tops, fresh and dried, collected in spring from plants cultivated in Britain.

Description.—*a.* Twigs densely covered with minute imbricated depressed leaves, with a large oval depressed central gland on their back.

b. Dark-green colour, or when dried yellowish-green.

c. Strong, peculiar, unpleasant odour, when rubbed or bruised; taste acrid, bitter, and disagreeable.

Pharmacy.—*Officinal Preparations :—*

a. Oleum Sabinæ. (*See* Oils).

b. Tinctura Sabinæ.

Savin tops, dried and coarsely powdered, ℥ 2 ½
Proof spirit, O 1.
} Made by maceration for 48 hours, and percolation.

c. Unguentum Sabinæ.

Fresh savin tops, bruised, 8
Yellow wax, 3
Benzoated lard, 16
} Melt the wax and lard in a water-bath; add the savin, and digest 20 minutes; express through calico.

Action.—Savin in the form of ointment is an **irritant,** and is used to keep blisters open. Internally it acts chiefly as a **carminative, emmenagogue,** and **ecbolic.** In large doses it is **irritant** to the alimentary canal.

Dose—Of Tincture, ♏ 20 to fl ℥ 1.

2. Scoparii Cacumina—Broom Tops.—The tops, fresh and dried.

Description.—*a.* Branched, straight, with five wing-like angles.

b. Nearly smooth, dark-green or yellowish-green, tough.

c. Leaves, when present, small, sessile, and simple above; stalked and trifoliate below.

d. Peculiar odour when fresh and bruised, which is lost in the process of drying; bitter and nauseous taste.

Pharmacy.—*Officinal Preparations:*—

a. Decoctum Scoparii.

Dried broom tops, ℥ 1 } Boil 10 minutes, strain,
Distilled water, O 1. } and make up to O 1.

b. Succus Scoparii.—Made by expressing the juice from fresh broom tops; adding rectified spirit, (1 to 3); setting aside 7 days; and filtering.

Action.—Scoparium is mainly used as a **diuretic.** In large doses it is a **purgative.**

Doses—Of Decoction, fl ℥ 2 to 4; Juice, fl ʒ 1 to 2.

Group VI.—LEAVES.

The following list includes the leaves which are officinal in the B.P. In some cases small branches or flowers are used along with the leaves, but these may also be considered in this connection.

Name.	Source.	Natural Order.
1. Aconiti Folia.	Aconitum Napellus.	Ranunculaceæ.
2. Belladonnæ Folia.	Atropa Belladonna.	Atropaceæ.
3. Buchu Folia.	Barosma Betulina. ,, Crenulata. ,, Serratifolia.	Rutaceæ.
4. Coca.	Erythroxylon Coca.	Erythroxylaceæ.
5. Conii Folia.	Conium Maculatum.	Umbelliferæ.
6. Digitalis Folia.	Digitalis Purpurea.	Scrophulariaceæ.

7. Hyoscyami Folia.	Hyoscyamus Niger.	Atropaceæ.
8. Jaborandi.	Pilocarpus Pennatifolius.	Rutaceæ.
9. Laurocerasi Folia.	Prunus Laurocerasus.	Rosaceæ.
10. Maticæ Folia.	Artanthe Elongata.	Piperaceæ.
11. Senna Alexandrina.	Cassia Acutifolia.	Leguminosæ.
12. Senna Indica.	„ Angustifolia.	
13. Tabaci Folia.	Nicotiana Tabacum.	Atropaceæ.
14. Uvæ Ursi Folia.	Arctostaphylos Uva Ursi.	Ericaceæ.

1. Aconiti Folia—Aconite Leaves.—The fresh leaves and flowering-tops, gathered when about one-third of the flowers are expanded, from plants cultivated in Britain.

Description.—*a.* Leaves alternate, with long channelled stalks, very deeply cut palmately into 5 or 3 segments, which are again deeply and irregularly divided into oblong acute narrow lobes.

b. Excite slowly, when chewed, a sensation of tingling and numbness.

c. Flowers large, irregular, deep-blue, in a somewhat loose terminal raceme.

Pharmacy.—*Officinal Preparation :—*

Extractum Aconiti.—One of the *green extracts*, made from the juice pressed out of the fresh leaves and flowering-tops, by the usual process.

Action.—The extract of aconite is administered internally, and its actions are similar to those of the tincture. (*See* Aconite Root).

Dose—Of Extract, gr. $\frac{1}{4}$ to 1.

2. Belladonnæ Folia—Belladonna Leaves.—

a. The fresh leaves with the branches to which they are attached.

b. The leaves separated from the branches and carefully dried, gathered when the fruit has begun to form, from plants growing wild or cultivated in Britain.

Description.—*a.* Leaves alternate below, in pairs above of unequal size; shortly stalked.

b. From 3 to 8 inches long.

c. Broadly ovate, acute, entire, smooth.

PHARMACY.—*Officinal Preparations:*—

a. Extractum Belladonnæ.—A *green extract*, made from the juice expressed out of the fresh leaves and young branches, in the usual way.

b. Succus Belladonnæ.—Made by pressing the juice from the fresh leaves and young branches, mixing with rectified spirit (1 to 3), and filtering in 7 days.

c. Tinctura Belladonnæ.

Belladonna leaves, in No. 20 powder, ℥ 1 Proof spirit, O 1.	Made by maceration for 48 hours, and percolation.

ACTION.—The preparations made from belladonna leaves are intended for internal administration, and they owe their effects to the atropine which they contain. The chief actions of this important drug may be thus briefly summarised:—In connection with the nervous system, belladonna in full doses is at first a **cerebral excitant,** and subsequently a **narcotic;** an **anodyne;** and a slight **spinal stimulant** and **sedative** in succession. It further acts as a typical **mydriatic.** In relation to the alimentary canal, it is markedly **anti-sialagogue, gastric sedative,** and **aperient,** causing increased peristaltic action of the bowels. With regard to the vascular system, belladonna in medicinal doses may be described as a **cardiac sedative** at first, slowing the heart's action, and afterwards as a **cardiac stimulant,** the rapidity of the heart's beats being increased, while their force is unaltered; at the same time affecting the vessels successively as a **vaso-contractor** and **vaso-dilator.** Upon the respiratory system it acts as a **respiratory stimulant, pulmonary sedative,** and **antispasmodic.** It diminishes most secretions, and is conspicuously an **anhydrotic** and **anti-galactagogue;** with reference to the urine, however, it seems to have generally a **diuretic** effect. In relation to the

genito-urinary apparatus, belladonna may also be employed as a **sedative** and **vesical tonic.**

Belladonna is one of the drugs the effects of which need to be watched. The symptoms indicating that its administration must be checked are dryness of the mouth and throat, and difficulty of swallowing; dilated pupils, with confused vision; flushing of the face, and conjunctival injection; diminished frequency of the pulse; and perhaps giddiness with uncertainty of gait. It sometimes causes an eruption like that of scarlatina. It is important to bear in mind that the external application of belladonna will occasionally produce these effects.

Doses—Of Extract, gr. $\frac{1}{4}$ to 1; Juice, ♏ 5 to 15; Tincture, ♏ 5 to 20.

3. Buchu Folia—Buchu Leaves.—The dried leaves.

Description.—The three varieties of buchu have the following characters in common:—

a. Smooth; colour dull yellowish-green.

b. Marked on the margins, and especially on their under surfaces, with oil-glands.

c. Odour strong, penetrating, and peculiar; taste aromatic, bitterish, and mint-like.

Their distinctive characters may be thus contrasted:—

	B. Betulina.	B. Crenulata.	B. Serratifolia.
a. Length.	From $\frac{1}{2}$ to $\frac{3}{4}$ inch.	From $\frac{3}{4}$ to about $1\frac{1}{4}$ inch.	From 1 to $1\frac{1}{2}$ inch.
b. Shape.	Cuneate or rhomboid-ovate; apex very blunt and usually recurved.	Oval-oblong or rhomboid-ovate; somewhat blunt at the apex; narrowed at the base into a distinct petiole.	Linear-lanceolate, equally tapering to each end; actual apex truncate.
c. Margin.	Serrate-dentate.	Finely serrate, or crenate-serrate.	Sharply and closely serrate.
d. Texture.	More cartilaginous.	Thickish.	Thinner than in the other varieties.

PHARMACY.—*Officinal Preparations:*—

a. Infusum Buchu.

Buchu leaves, bruised, ℥ ½
Boiling distilled water, fl ℥ 10.
} Infuse half an hour, and strain.

b. Tinctura Buchu.

Buchu leaves, in No. 20 powder, ℥ 2½
Proof spirit, O 1.
} Made by maceration for 48 hours, and percolation.

ACTION.—Buchu is almost solely employed as a **diuretic,** and for its supposed **specific** effects upon the urinary mucous membrane. It is also a **stomachic tonic.**

Doses—Of Infusion, fl ℥ 1 to 4; of Tincture, fl ʒ 1 to 2.

4. COCA.—The dried leaves.

DESCRIPTION.—*a.* Shortly stalked.

b. One to two inches or more in length; of varying thickness.

c. Oval or lanceolate, entire, usually blunt and emarginate.

d. Quite smooth; midrib prominent, with numerous faint freely anastomosing lateral veins, and on each side of the midrib a curved line extends from base to apex.

e. Green above, somewhat paler beneath.

f. Odour faintly tea-like, especially when bruised; taste somewhat bitter and aromatic.

(In commercial specimens the leaves are more or less broken, and frequently yellowish-green, yellowish-brown, or brown, and in rare cases the curved lines are indistinguishable).

PHARMACY.—*Officinal Preparations:*—

a. Extractum Cocæ Liquidum.—Made from coca, in No. 40 powder, by maceration and percolation with proof spirit. Part of the product is evaporated to the consistence of a soft extract, and

dissolved in the remainder, and the whole made up to a certain volume by adding more spirit.

b. Cocaïnæ Hydrochloras. (*See* ALKALOIDS).

ACTION.—Coca is administered internally as a **stimulant** and **tonic,** and is mainly used to enable persons to endure muscular exertion without fatigue, and as a restorative in various conditions.

Doses—Of Coca, ʒ ½ to 2, chewed or infused in hot water; Liquid Extract, fl ʒ ½ to 2.

5. CONII FOLIA—HEMLOCK LEAVES.—The fresh leaves and young branches; gathered from wild British plants when the fruit begins to form.

DESCRIPTION.—*a.* Leaves more or less divided in a pinnate manner, the lower leaves decompound, and sometimes 2 feet in length; glabrous.

b. Stem *smooth,* marked with *dark purple spots.*

c. Clasping petioles of varying lengths, those of the lower leaves being hollow.

d. Odour strong and very disagreeable, more especially when rubbed with solution of potash.

PHARMACY.—*Officinal Preparations:*—The officinal preparations made directly from conium leaves are two, namely:—

a. Extractum Conii.—A *green extract* made from the juice pressed out of the fresh leaves and young branches, in the usual way.

b. Succus Conii.—Made by pressing the juice out of the fresh leaves and young branches, adding rectified spirit (1 to 3), and filtering in 7 days.

From these preparations the following are made:—

c. Pilula Conii Composita.

Extract of hemlock, ʒ 2½
Ipecacuanha, in powder, ʒ ½
Treacle, a sufficiency.
} Mix the extract and ipecacuanha, and add sufficient treacle to form a pill mass.

d. Cataplasma Conii.—Made by evaporating the juice of hemlock to half its volume, and mixing with a hot linseed-meal poultice.

e. Vapor Coninæ.

Juice of hemlock, fl ʒ ½
Solution of potash, fl ʒ 1
Distilled water, fl ʒ 1.
} Mix. Put ♏ 20 on the sponge in a steam-inhaler.

Action.—Locally applied in the form of cataplasm, conium is believed to act as an **anodyne.** Internally it is used mainly as an **antispasmodic,** and ultimately becomes a **paralyser** of muscles, chiefly by affecting the ends of the motor nerves, but partly by acting on the spinal cord. It is also employed as a **pulmonary sedative,** especially in the form of inhalation.

Doses—Of Extract, gr. 2 to 6; Compound Pill, gr. 5 to 10; Juice, ♏ 30 to 60.

6. Digitalis Folia—Foxglove Leaves.—The leaves, collected from wild British plants of the second year's growth, when about two-thirds of the flowers are expanded, and carefully dried.

Description.—*a.* From 4 to 12 or more inches in length, and sometimes as much as 5 or 6 inches broad, with a winged petiole of varying length.

b. Ovate or ovate-lanceolate, subacute, crenate or irregularly crenate-dentate.

c. Somewhat rugose, slightly hairy and dull-green above, densely pubescent and paler beneath.

d. Taste very bitter, unpleasant; odour faint, agreeable, and tea-like.

Pharmacy.—*Officinal Preparations:*—

a. Infusum Digitalis.

Foxglove leaves, dried, gr. 28
Boiling distilled water, fl ʒ 10.
} Infuse fifteen minutes, and strain.

b. Tinctura Digitalis.

Foxglove leaves, in No. 20 powder, ʒ 2½
Proof spirit, O 1.
} Made by maceration for 48 hours, and percolation.

Action.—The chief action of digitalis is exerted upon the vascular system. It is recognised ordinarily as a typical **cardiac regulator** or **tonic**, but in large doses it becomes a **cardiac depressant.** Moreover, it is at first a **vaso-contractor,** but subsequently a **vaso-dilator.** Indirectly, by its effects in the circulation, digitalis is a valuable **diuretic** under certain conditions; and it may also thus act as a **cerebral sedative** or **hypnotic.** It is also regarded as an **antipyretic,** and **emmenagogue;** and has been used empirically in the treatment of **delirium tremens.** In excessive doses digitalis not only depresses the circulation, but is liable to cause derangement of the alimentary canal, indicated by loss of appetite, disordered digestion, sickness, and sometimes diarrhœa.

Doses—Of Digitalis, gr. $\frac{1}{2}$ to $1\frac{1}{2}$; Infusion, fl ʒ 2 to 4; Tincture, ♏ 10 to 30.

7. Hyoscyami Folia—Henbane Leaves.

a. The fresh leaves and flowers, with the branches to which they are attached.

b. The leaves separated from the branches and flowering tops, and carefully dried.

Description.—*a.* Leaves varying in length, sometimes as much as 10 inches, with or without a stalk, alternate, exstipulate.

b. Triangular-ovate or ovate-oblong, acute, undulated, irregularly-toothed, sinuated, or pinnatifid.

c. Pale-green, and glandular-hairy, particularly on their under surface.

d. The branches are sub-cylindrical, and also glandular—hairy.

e. The fresh herb has a strong heavy odour; and a bitter and slightly acrid taste.

Pharmacy.—*Officinal Preparations:*—

a. Extractum Hyoscyami.—A *green extract,* prepared from the fresh juice in the usual way.

b. Succus Hyoscyami. — Made by pressing the juice out of the fresh leaves, flowering tops, and young branches; mixing it with rectified spirit (1 to 3); and filtering in 7 days.

c. Tinctura Hyoscyami.

Henbane leaves, or flowering tops, in No. 20 powder, ℥ 2½ Proof spirit, O 1.	Made by maceration for 48 hours, and percolation.

Action.—Henbane has more or less the effects of belladonna, but it is chiefly used as a **hypnotic, pulmonary sedative, vesical sedative,** and as an **aid to purgatives.**

Doses—Of Extract, gr. 5 to 10; Juice, fl ℥ ½ to 1; Tincture, fl ℥ ½ to 1.

8. Jaborandi.—The dried leaflets.

Description.—*a.* Leaflets very shortly stalked.

b. Usually 4 inches or more in length.

c. Oval-oblong or oblong-lanceolate, somewhat unequal at the base, obtuse and emarginate, slightly revolute and entire at the margins.

d. Upper surface glabrous, except when young, dull-green; under surface paler, often somewhat hairy, with a very prominent midrib, and seen to be marked irregularly all over with pellucid dots when held against the light.

e. Coriaceous in texture.

f. Odour when bruised slightly aromatic; taste on chewing slightly bitter and aromatic at first, but subsequently pungent and increasing the flow of saliva.

Pharmacy.—*Officinal Preparations:*—

a. Extractum Jaborandi.—Made from Jaborandi, in No. 40 powder, by maceration and percolation with proof spirit and water, and evaporation of the product.

b. Infusum Jaborandi.

Jaborandi, cut small, ℥ ½
Boiling distilled water, fl ℥ 10. } Infuse for half an hour, and strain.

c. Tinctura Jaborandi.

Jaborandi, in No. 40 powder, ℥ 5
Proof spirit, O 1 } Made by maceration for 48 hours, and percolation.

d. Pilocarpinæ Nitras. (*See* ALKALOIDS).

ACTION.—Applied to the eye jaborandi is a **myotic.** Internally administered its chief action is that of a rapid and powerful **diaphoretic.** It is also a **sialagogue,** and **vascular depressant.**

Doses—Of Extract, gr. 2 to 10; Infusion, fl ℥ 1 to 2; Tincture, fl ℥ ½ to 1.

9. LAUROCERASI FOLIA—CHERRY-LAUREL LEAVES.—The fresh leaves.

DESCRIPTION.—*a.* Thick, coriaceous, 5 to 7 inches long; on strong short petioles.

b. Oblong or somewhat obovate, tapering towards each end, recurved at the apex, distantly but sharply serrated and slightly revolute at the margins.

c. Dark-green, smooth and shining above; much paler beneath, and with a prominent midrib, on either side of which, towards the base, are one or two glandular depressions.

d. Inodorous, except on bruising, when they emit a ratafia-like odour.

PHARMACY.—*Officinal Preparation :—*

Aqua Laurocerasi.—Made by distilling the chopped and crushed fresh leaves with water (lb 1 to O 2½), until O 1 passes over. The product is shaken, filtered through paper, and its strength adjusted, either by adding diluted hydrocyanic acid, or diluting with distilled water, so that it corresponds to 0·1 per cent. of real hydrocyanic acid.

ACTION.—Cherry-laurel water has the actions of hydrocyanic acid. (*See* HYDROCYANIC ACID).

Dose—fl ʒ ½ to 2.

10. MATICÆ FOLIA—MATICO LEAVES.—The dried leaves.

DESCRIPTION.—*a.* From about 4 to 8 inches long, very shortly petiolate.

b. Oblong-lanceolate, tapering towards the apex, cordate and unequal at the base, entire or minutely crenulate.

c. Greenish-yellow, reticulated with sunken veins and tesselated above, the veins prominent beneath, and the depressions formed by them densely clothed with hairs.

d. Taste aromatic, bitterish; odour pleasant, feebly aromatic.

(The leaves as commonly seen in commerce are more or less broken, folded, and compressed into a brittle mass, and have mixed with them a variable proportion of the jointed stems, flowers, and fruit).

PHARMACY.—*Officinal Preparation:*—

Infusum Maticæ.

Matico leaves, cut small, ʒ ½ } Infuse ½ an hour,
Boiling distilled water, fl ʒ 10 } and strain.

ACTION.—Matico is chiefly used as a **local styptic.** It is also supposed to be an **astringent** when given internally.

Dose—Of Infusion, fl ʒ 1 to 4.

11. { SENNA ALEXANDRINA—ALEXANDRIAN SENNA.
{ SENNA INDICA—EAST INDIAN SENNA.

The dried leaflets.

Alexandrian Senna is imported from Alexandria, and sometimes in a more or less contaminated condition, in which case the true senna leaflets should be carefully separated from all extraneous matters.

East Indian or *Tinnivelly Senna* is obtained from plants cultivated in Southern India; it is imported without admixture of other leaves or extraneous matters of any kind.

DESCRIPTION.—The leaflets of the two varieties of Senna have the following characters in common:—

a. Entire, acute, unequal at the base.

b. Thin and brittle in texture.

c. Odour peculiar, faint, tea-like; taste mucilaginous, nauseous, and sickly.

The points in which they differ may be thus contrasted:—

	ALEXANDRIAN.	EAST INDIAN.
a. Length.	About ¾ of an inch to more than an inch.	From about 1 to 2 inches.
b. Shape.	Lanceolate or oval-lanceolate.	Lanceolate.
c. Colour and Surfaces.	Pale yellowish-green, evidently veined on lower surface, and very finely pubescent or nearly smooth.	Yellowish-green and smooth above, somewhat duller beneath, and glabrous or slightly pubescent.

ADULTERATIONS.—The most important adulteration of Senna is *Cynanchum argel*, the leaves of which are distinguished by being thicker and stiffer; paler in colour; *equal at the base*; wrinkled; and having a bitter taste. Other leaves, not met with in this country, are Colutea arborescens; Coriaria myrtifolia; and Tephrosia apollinea.

PHARMACY.—1. *Officinal Preparations:*—

a. Confectio Sennæ.—A mixture of Senna, in fine powder, with several aperient fruits, coriander fruit, extract of liquorice, refined sugar, and distilled water.

b. Infusum Sennæ.

Senna, ℥ 1
Ginger, sliced, gr. 28
Boiling distilled water, fl ℥ 10.
} Infuse half an hour, and strain.

c. Mistura Sennæ Composita.

Sulphate of magnesium, ℥ 4
Liquid extract of liquorice, ℥ 1
Tincture of senna, fl ℥ 2½
Compound tincture of cardamoms, fl ℥ 1½
Infusion of senna, fl ℥ 15

Dissolve the sulphate of magnesium in the infusion of senna with the aid of a little heat, then add the liquid extract and the tinctures.

d. Syrupus Sennæ.—Made by digesting Senna, broken small, with distilled water at 120°; pressing, straining, and evaporating; when cold, adding rectified spirit and oil of coriander; filtering; and dissolving refined sugar by the aid of heat.

e. Tinctura Sennæ.

Senna, broken small, ℥ 2½
Raisins, freed from seeds, ℥ 2
Caraway fruit, bruised, ℥ ½
Coriander fruit, bruised, ℥ ½
Proof spirit, O 1.

Made by maceration for 48 hours, and percolation.

2. Senna is one of the active ingredients in Compound Liquorice Powder.

Action.—Senna acts as a **simple purgative.**

Doses—Of Confection, gr. 60 to 120; Infusion, fl ℥ 1 to 2; Compound Mixture, fl ℥ 1 to 1½; Compound Liquorice Powder, gr. 30 to 60; Syrup, fl ℥ 1 to 4; Tincture, fl ℥ 1 to 4.

12. Tabaci Folia—Leaf Tobacco.—The dried leaves.

Description.—*a.* Large, being sometimes more than 20 inches long.

b. Ovate or ovate-lanceolate, or oval-oblong; acute, entire.

c. Brown, brittle, glandular-hairy.

d. Characteristic, heavy, narcotic odour; nauseous, bitter, and acrid taste.

e. Yield, when distilled with solution of potash, an alkaline fluid, which has the peculiar odour of nicotina, and precipitates with perchloride of platinum and tincture of galls.

Action.—For therapeutic purposes tobacco is now only practically used in two ways. In the form of snuff it is a **sternutatory.** Smoked it may act as an **aperient** in some cases, a **cerebral sedative,** and a **pulmonary sedative.** Used in excess it becomes an **emetic, general depressant,** and **narcotic.** Tobacco was formerly administered internally and by enema, but is rarely, if ever, so employed at the present time.

13. Uvæ Ursi Folia—Bearberry Leaves.—The dried leaves, from indigenous plants.

Description.—*a.* Leaves very shortly stalked.

b. From $\frac{1}{2}$ to about $\frac{3}{4}$ of an inch long.

c. Obovate or spathulate; margins entire and slightly revolute.

d. Coriaceous in texture.

e. Smooth and shining on the upper surface; paler coloured and minutely reticulated beneath.

f. Odour faintly tea-like when powdered; taste very astringent.

Pharmacy.—1. *Officinal Preparation:—*

Infusum Uvæ Ursi.

Bearberry leaves, bruised, ℥ ½	Infuse for one hour, and strain.
Boiling distilled water, fl ℥ 10.	

2. *Incompatibles.*—Iron and lead salts; nitrate of silver; vegetable alkaloids; gelatine. The infusion gives a bluish-black precipitate with perchloride of iron.

Action.—Bearberry leaves are **astringent,** but are used almost entirely for this purpose in diseases of the urinary tract. They are also supposed to be **diuretic.**

Dose—Of Infusion, fl ℥ 1 to 2.

Group VII. — FLOWERING OR FRUITING TOPS, FLOWERS, AND BUDS.

The drugs belonging to this group may be enumerated in alphabetical order according to the following arrangement :—

Name.	Source.	Part used.	Nat. Order.
1. Anthemidis Flores—Chamomile Flowers	Anthemis Nobilis	Dried flower-heads	Compositæ.
2. Cannabis Indica—Indian Hemp	Cannabis Indica	Dried flowering- and fruiting-tops	Cannabinaceæ.
3. Caryophyllum—Clove	Eugenia Caryophyllata	Dried flower-bud	Myrtaceæ.
4. Crocus—Saffron	Crocus Sativus	Dried stigma and style	Iridaceæ.
5. Cusso—Kousso	Hagenia Abyssinica	Dried panicles	Rosaceæ.
6. Lupulus—Hop	Humulus Lupulus	Dried strobiles	Cannabinaceæ.
7. Rhœados Petala—Red Poppy Petals	Papaver Rhœas	Fresh petals	Papaveraceæ.
8. Rosæ Centifoliæ Petala—Cabbage-Rose Petals	Rosa Centifolia	Fresh petals	Rosaceæ.
9. Rosæ Gallicæ Petala—Red-Rose Petals	Rosa Gallica	Fresh and dried petals	Rosaceæ.
10. Sambuci Flores—Elder Flowers	Sambucus Nigra	Fresh flowers	Caprifoliaceæ.
11. Santonica	Artemisia Maritima	Dried unexpanded flower-heads	Compositæ.

1. Anthemidis Flores—Chamomile Flowers.—The dried single and double flower-heads or capitula. From cultivated plants.

DESCRIPTION.—*a.* The single chamomile flowers are those in which the capitula have some yellow tubular florets in the centre, surrounded by a variable number of those which are white and ligulate; the double flowers are those in which all or nearly all the florets are white and ligulate.

b. In both kinds the receptacle is solid, conical, and densely covered with chaffy scales.

c. Both varieties, but especially the single, have a strong aromatic odour, and very bitter taste.

PHARMACY.—*Officinal Preparations:*—

a. Extractum Anthemidis.—Made by boiling chamomile flowers with distilled water; straining, pressing, and filtering; evaporating to a pilular consistence; and adding oil of chamomile.

b. Infusum Anthemidis.

Chamomile flowers, ℥ ½
Boiling distilled water, fl ℥ 10.
} Infuse fifteen minutes, and strain.

c. Oleum Anthemidis. (*See* OILS).

ACTION.—Chamomile is a popular local remedy used as an **anodyne,** in the form of a poultice or fomentation. Internally it is mainly employed as a bitter and aromatic **stomachic tonic.** It is also **anthelmintic;** and **emetic** when given in large quantities. The extract is used as an ingredient in purgative pills, to act as a **carminative.**

Doses—Of Extract, gr. 2 to 10; Infusion, fl ℥ 1 to 4, or 5 to 10 as an emetic.

2. CANNABIS INDICA—INDIAN HEMP. (In India known as Gunjah or Ganga).—The dried flowering or fruiting tops of the *female plants,* grown in India, and from which the resin has not been removed.

DESCRIPTION.—*a.* In small more or less aggregated masses, from about 1½ to 2½ inches in length,

and consisting of the tops of one or more alternate branches, bearing the remains of the flowers and smaller leaves, with a few ripe fruits, and the whole pressed together by adhesive resinous matter; or composed of straight stiff woody stems, several inches long, surrounded by the branched flower-stalks.

b. Rough to the touch; very brittle; of a dusky-green colour.

c. Scarcely any taste; faint peculiar narcotic, not unpleasant odour.

PHARMACY.—*Officinal Preparations:*—

a. Extractum Cannabis Indicæ.—An *alcoholic extract*, made with rectified spirit, by maceration for 7 days, and evaporation by a water-bath.

b. Tinctura Cannabis Indicæ.

Extract of Indian hemp, ℥ 1
Rectified spirit, O 1
} Dissolve.

ACTION.—Indian hemp is at first a **cerebral excitant,** and afterwards **hypnotic** or **narcotic.** It is also supposed to be an **anodyne** and **antispasmodic.**

Doses—Of Extract, gr. ¼ to 1; Tincture, ♏ 5 to 20.

3. CARYOPHYLLUM — CLOVE.—The dried flower-buds.

DESCRIPTION.—*a.* Over ½ an inch long, and consisting of a dark-brown, wrinkled, sub-cylindrical, and somewhat angular calyx tube, which tapers below, and is surmounted by 4 teeth, between which the paler-coloured petals, enclosing the numerous stamens and style, are rolled up in the form of a ball.

b. Odour strong, fragrant, and spicy; taste very pungent and aromatic.

c. Emits oil when indented with the nail.

PHARMACY.—1. *Officinal Preparations :—*

a. Infusum Caryophylli.

Cloves, bruised, ʒ ¼
Boiling distilled water, fl ʒ 10. } Infuse for half an hour, and strain.

b. Oleum Caryophylli. (*See* OILS).

2. Cloves are contained in Infusum Aurantii Compositum, Mistura Ferri Aromatica, and Vinum Opii.

3. *Incompatibles.* — Mineral acids; lime-water; salts of iron; gelatine.

ACTION.—Clove is mainly used as a **flavouring** agent and **carminative.** It is also somewhat **stimulant** and **astringent.**

Dose—Of Infusion, fl ʒ 1 to 4.

4. CROCUS—SAFFRON.—The dried stigma and top of the style.

DESCRIPTION.—*a.* Each entire portion of saffron is an inch or somewhat more in length.

b. It consists of three thread-like, orange-red stigmas, thickened and tubular above, jagged or notched at their extremities, and united below to the top of the yellow style. It is flexible; and unctuous to the touch.

c. Peculiar strong aromatic odour; bitter, somewhat aromatic taste.

TESTS.—Rubbed on the wet finger saffron leaves an intense orange-yellow tint. When pressed between folds of white filtering paper, it leaves no oily stain. When a small portion is placed in a glass of warm water it colours the liquid orange-yellow, but should not deposit any white or coloured powder. Ignited with free access of air, it yields about 6 per cent. of ash.

PHARMACY.—1. *Officinal Preparation :—*
Tinctura Croci.

Saffron, ʒ 1
Proof spirit, O 1. } Made by maceration for 48 hours, and percolation.

2. Saffron is an ingredient in Decoctum Aloes Compositum, Pilula Aloes et Myrrhæ, Pulvis Cretæ Aromaticus, Tinctura Cinchonæ Composita, Tinctura Opii Ammoniata, and Tinctura Rhei.

ACTION.—Saffron is used as a **colouring** and **flavouring** agent. It is also somewhat **stimulant.**

5. CUSSO—KOUSSO.—The dried panicles, chiefly of the female flowers.

DESCRIPTION.—*a.* In compressed clusters or more or less cylindrical rolls, usually 10 inches or more in length, or the panicles are broken up into small fragments.

b. Brownish or greenish-brown, or reddish in the case of the female flowers.

c. The separate panicles are much branched, zigzag, more or less covered with hairs and glands, and with a large sheathing bract at the base of every branch.

d. Flowers numerous, small, shortly stalked, unisexual, with two roundish membranous veiny bracts at the base of each flower, which are brownish-yellow in the male, and tinged with red in the female flowers; calyx hairy externally, veiny, with ten segments in two alternating whorls.

e. Odour herby, tea-like; taste bitter, acrid, and disagreeable.

PHARMACY.—*Officinal Preparation :—*
Infusum Cusso.

Kousso, in coarse powder, ʒ ½
Boiling distilled water, fl ʒ 8. } Infuse for 15 minutes. *Not to be strained.*

Action.—Kousso is an **anthelmintic,** used chiefly for tape-worm.

Doses—Of Kousso, ʒ ¼ to ½; Infusion, fl ʒ 4 to 8.

6. Lupulus—Hop.—The dried strobiles, from plants cultivated in England.

Description.—*a.* When entire, about 1¼ inch long; usually more or less compressed and broken.

b. Oblong-ovoid or rounded in form, and consisting of a number of thin greenish-yellow or brownish membranous imbricated scales or bracts; each of which has at its base a small rounded achene sprinkled over with brownish-yellow glands (lupulin), the whole being attached to a hairy undulated axis.

c. Odour agreeably aromatic; taste bitter, aromatic, and feebly astringent.

Pharmacy.—*Officinal Preparations:*—

a. Extractum Lupuli.—Made by first acting upon hop by rectified spirit, and preparing a soft alcoholic extract; then making a watery extract of the residual hop; mixing the two; and evaporating under 140° to a suitable consistence.

b. Infusum Lupuli.

Hop, ʒ ½
Boiling distilled water, fl ʒ 10. } Infuse for 1 hour, and strain.

c. Tinctura Lupuli.

Hop, ʒ 2½
Proof spirit, O 1. } Made by maceration for 48 hours, and percolation.

Action.—Hop is an aromatic and bitter **stomachic tonic.** It is also somewhat **diuretic** and **hypnotic.**

Doses—Of Extract, gr. 5 to 15; Infusion, fl ʒ 1 to 2; Tincture, fl ʒ ½ to 2.

7. Rhœados Petala—Red Poppy Petals.—The fresh petals.

DESCRIPTION.—*a.* Of a bright-scarlet colour, often nearly black at the base.

b. Unequal in size.

c. Strong narcotic odour; and slightly bitter taste.

PHARMACY.—*Officinal Preparation:*—

Syrupus Rhœados.—Made by adding fresh red poppy petals gradually to water, heated in a water-bath, frequently stirring; infusing for 12 hours, pressing, and straining; dissolving refined sugar by means of heat; adding rectified spirit when nearly cold, and distilled water to a certain proportion.

ACTION.—The syrup is merely used as a colouring agent. *Dose*—fl ʒ i.

8. ROSÆ CENTIFOLIÆ PETALA—CABBAGE-ROSE PETALS.—The fresh fully-expanded petals. From plants cultivated in Britain.

DESCRIPTION.—*a.* Large, thin, delicate petals.

b. Very fragrant odour; taste sweetish, slightly astringent, and bitterish. Both odour and taste are readily imparted to water.

PHARMACY.—1. *Officinal Preparation:*—

Aqua Rosæ.

Fresh petals of the hundred-leaved rose, ℔ 10 (or an equivalent quantity of the petals preserved while fresh with common salt)	Distil C 1.
Water, C 5.	

2. Rose water is contained in Mistura Ferri Composita, and Trochisci Bismuthi.

ACTION.—Rose water is employed as a **flavouring** agent; or for its **odour.**

9. ROSÆ GALLICÆ PETALA—RED-ROSE PETALS.—The fresh and dried unexpanded petals. From plants cultivated in Britain.

Description.—*a.* Usually in little cone-like masses; or sometimes separate and more or less crumpled petals.

b. Fine purplish-red, the colour being retained after drying; velvety.

c. Odour fragrant, roseate, especially developed by drying; taste bitterish, feebly acid, and astringent.

Pharmacy.—*Officinal Preparations:*—

a. Confectio Rosæ Gallicæ.—Made by beating the fresh petals into a pulp in a stone mortar; adding refined sugar (3 to 1); and rubbing well together.

b. Infusum Rosæ Acidum.

Dried red-rose petals, broken up, ʒ ¼ Diluted sulphuric acid, fl ʒ 1 Boiling distilled water, fl ʒ 10.	Infuse for half an hour, and strain.

c. Syrupus Rosæ Gallicæ.—Made by infusing dried red-rose petals in boiling distilled water for 2 hours; squeezing through calico; heating to the boiling point; filtering; and dissolving refined sugar with heat.

Action.—The preparations of the red-rose petals are used chiefly as **colouring** and **flavouring** agents. The confection is employed to make up pills. The infusion is somewhat **astringent.**

Doses—Of Infusion, fl ʒ 1 to 2; Syrup, fl ʒ 1.

10. Sambuci Flores—Elder Flowers.—The fresh flowers. From indigenous plants.

Description.—*a.* In corymbose cymes, from 5 to 7 inches across.

b. Flowers small; calyx superior, 5-toothed; corolla flat, rotate, 5-sected, creamy-white, with 5 stamens inserted in the tubes.

c. Odour fragrant, but somewhat sickly; taste bitterish.

PHARMACY.—*Officinal Preparation :—*

Aqua Sambuci.

Fresh elder flowers, separated from the stalks, lb 10 (or an equivalent quantity of the flowers preserved while fresh with common salt)
Water, C 5.
} Distil C 1.

ACTION.—Elder flower water is merely used as a **flavouring** agent.

11. SANTONICA.—The dried unexpanded flower-heads or capitula.

DESCRIPTION.—*a.* About $\frac{1}{10}$ of an inch in length; oblong-ovoid, obtuse.

b. Pale greenish-brown; nearly smooth.

c. Resemble seeds in appearance, but consist of from 12 to 18 imbricated involucral scales, with a broad thick yellowish-green midrib, enclosing 3 to 5 somewhat tubular florets.

d. Odour, especially when rubbed, strong, peculiar, and somewhat camphoraceous; taste bitter and camphoraceous.

PHARMACY.—Santonica is the source of *Santonin* (*See* NEUTRAL PRINCIPLES).

ACTION.—Santonica is an **anthelmintic,** affecting the round worm, but it is seldom used, santonin being much more suitable as a remedy.

Dose—gr. 10 to 60.

GROUP VIII.—FRUITS.

The *officinal fruits* and drugs derived from them may, for practical purposes, be arranged under certain divisions; but in some cases a mere enumeration will suffice, as the general appearance of the fruit is well known, and it is quite unnecessary for the student to burden his memory with a description of its characters, as given in the B.P.

A. Fruits in common use.

1. { Aurantii Fructus—Bitter Orange.
   Aurantii Cortex—Bitter-Orange Peel.
   Citrus Vulgaris. *N.O. Aurantiaceæ.*

Aurantii Fructus is the ripe fruit. It is introduced into the B.P. for the purpose of obtaining the fresh rind, which contains a large number of oil-vesicles, and is aromatic and bitter.

Aurantii Cortex is the dried outer part of the rind or pericarp.

Pharmacy.—1. *Officinal Preparations:—*

a. Infusum Aurantii.

Bitter-orange peel, cut small, ʒ 1½
Boiling distilled water, fl ʒ 10.
} Infuse fifteen minutes, and strain.

b. Infusum Aurantii Compositum.

Bitter-orange peel, cut small, ʒ 1¼
Fresh lemon peel, cut small, gr. 56
Cloves, bruised, gr. 28
Boiling distilled water, fl ʒ 10.
} Infuse 15 minutes, and strain.

c. Syrupus Aurantii.

Tincture of orange peel, 1
Syrup, 7
} Mix.

d. Tinctura Aurantii.

Dried orange peel, ʒ 2
Proof spirit, O 1.
} Macerate 7 days; strain, press, and filter; and make up to O 1.

e. Tinctura Aurantii Recentis.—Carefully cut from the orange the coloured part of the rind in thin slices, and macerate ʒ 6 in Rectified spirit, fl ʒ 18, for a week, with frequent agitation. Pour off the liquid, press the dregs, mix the liquid products, and filter. If necessary add spirit to make up O 1.

f. Vinum Aurantii.—Made in Britain by fermenting a saccharine solution to which the fresh peel of the bitter orange has been added. It contains 10 to 12 per cent. of alcohol.

2. *Bitter-orange peel* is an ingredient in Infusum Gentianæ Compositum, and Tinctura Gentianæ Composita; in Spiritus Armoraciæ Compositus; and in Tinctura Cinchonæ Composita. The *Syrup* is contained in Confectio Sulphuris; the *Tincture* in Mistura Ferri Aromatica and Tinctura Quininæ; and the *Wine* in Vinum Ferri Citratis and Vinum Quininæ.

Action.—The preparations of orange peel are used as **flavouring** agents, and also as **aromatic**; and **bitter stomachic tonics.**

Doses—Of either Infusion, fl ʒ i to 2; Syrup, fl ʒ i; either Tincture, fl ʒ i to 2.

2. Ficus—Fig. Ficus Carica. *N.O. Moraceæ.* The dried fruit.

Pharmacy.—Figs are contained in Confectio Sennæ.

Action.—Figs are popularly used as a poultice. Internally they act as a **laxative.**

3. { Limonis Cortex—Lemon Peel } Citrus
{ Limonis Succus—Lemon Juice }
Limonum. *N.O. Aurantiaceæ.*

Limonis Cortex is the outer part of the rind or pericarp of the fresh fruit. It contains numerous oil-globules, and is aromatic and bitter.

Limonis Succus is the freshly expressed juice of the ripe fruit. It is a slightly turbid yellowish liquid, with a sharp acid taste. It contains from gr. 36 to 46 of citric acid in fl ʒ i.

Pharmacy.—1. *Officinal Preparations:*—

a. Oleum Limonis. (*See* Oils).

b. Syrupus Limonis.—Made by heating lemon juice to the boiling point, adding lemon peel, and allowing the liquid to cool; filtering; and dissolving refined sugar with the aid of heat.

c. Tinctura Limonis.

Fresh lemon peel, cut small, ℥ 2½
Proof spirit, O 1.
} Macerate 7 days; strain, press, and filter; make up to O 1.

2. *Lemon peel* is contained in Infusum Aurantii Compositum, and Infusum Gentianæ Compositum. *Lemon juice* is the source of Citric Acid.

Action.—Lemon peel is a **carminative,** and an **aromatic bitter.** It is much employed as a **flavouring** agent.

Lemon juice is chiefly used for making effervescent draughts, and as a **refrigerant.** It is also administered in cases of scurvy (**antiscorbutic**), gout, and rheumatism.

Doses—Of Syrup, fl ʒ 1; Tincture, fl ʒ ½ to 2; Lemon Juice, fl ʒ ½ to 4.

4. Mori Succus—Mulberry Juice. The juice of the ripe fruit of Morus Nigra. *N.O. Moraceæ.* Of a dark violet or purple colour; with a faint odour, and a refreshing acidulous saccharine taste.

Pharmacy.—*Officinal Preparation :—*

Syrupus Mori.—Made by heating mulberry juice to the boiling point; filtering when cool; dissolving refined sugar with the aid of heat; and adding rectified spirit.

Action.—Mulberry juice is chiefly employed as a **flavouring** and **colouring** agent. It is somewhat **refrigerant** and **laxative.**

Dose—Of Syrup, fl ʒ 1.

5. Prunum—Prune. Prunus Domestica. *N.O. Rosaceæ.* The dried drupe.

Pharmacy.—Prune is contained in Confectio Sennæ.

Action.—Prune is a **laxative.**

6. Tamarindus—Tamarind. Tamarindus Indica. *N.O. Leguminosæ.* The preserved pulp of the fruit. It has an agreeable, refreshing, subacid taste. A piece of bright iron, left in contact with the pulp for an hour, does not exhibit any deposit of copper.

Pharmacy.—Tamarind is contained in Confectio Sennæ.

Action.—Tamarind is used as a **refrigerant,** made into a drink; it is also a **laxative.**

7. Uvæ—Raisins. Vitis Vinifera. *N.O. Vitaceæ.* The ripe fruit, dried by the heat of the sun, or partly by the sun's heat, and partly by artificial heat. Imported from Spain.

Pharmacy.—Raisins are contained in Tinctura Cardamomi Composita, and Tinctura Sennæ.

Action.—Raisins are merely used for their **flavour.**

B. Umbelliferous Fruits.

This division includes the fruits belonging to the *N.O. Umbelliferæ.* They are botanically named *cremocarps,* and each cremocarp consists of two symmetrical halves or *mericarps.* Alphabetically arranged they include:—

1. Anethi Fructus—Dill Fruit. Anethum Graveolens.

2. Anisi Fructus—Anise Fruit. Pimpinella Anisum.

3. Carui Fructus—Caraway. Carum Carui.

4. Conium Fructus—Conium Fruit. Conium Maculatum.

5. Coriandri Fructus—Coriander. Coriandrum Sativum.

6. Fœniculi Fructus—Fennel Fruit. Fœniculum Dulce.

General Description.—The Umbelliferous fruits as a class have the following well-defined characters:—

1. They are all very small seed-like bodies, the largest being only 3 lines long (*Fennel*).

2. They have a more or less elongated shape, except *Coriander*, which is globular.

3. Their colour varies from yellowish-brown to dark-brown, except *Conium*, which is dull-grey.

4. They present *Juga* or minute ridges, varying in number and arrangement; and most of them have one or more *Vittæ* or oil ducts.

5. Each fruit has a characteristic and peculiar odour and taste, which is of an aromatic character, except in the case of *Conium*, which, when reduced to powder, and rubbed with solution of potash, gives out a very strong and disagreeable odour.

Special Characters.—The several Umbelliferous fruits are distinguished by their exact shape, size, and colour; the presence or absence, number, and characters of juga and vittæ, and their odour and taste. The student may obtain full information on these points from the B.P. He ought, however, to be so familiar with their *general appearance* and *odour*, as to be able to recognise them at once..

Pharmacy.—The important facts relating to this part of the subject may be thus summarised:—

1. Dill, anise, caraway, and coriander, each yield an officinal *Volatile Oil*. (*See* Oils).

2. There are four officinal *Aquæ* made from the Umbelliferous fruits, namely:—

a. Aqua Anethi
b. Aqua Anisi
c. Aqua Carui
d. Aqua Fœniculi
} Each prepared from { Bruised fruit, lb 1 / Water, C 2 } Distil C 1.

3. *Caraway* is an ingredient in Confectio Opii, Confectio Piperis, Pulvis Opii Compositus, Tinctura Cardamomi Composita, and Tinctura Sennæ.

Coriander is present in Confectio Sennæ, Syrupus Rhei, Tinctura Rhei, and Tinctura Sennæ. *Fennel* is contained in Pulvis Glycyrrhizæ Compositus.

4. Hemlock fruit has one preparation, namely:—

Tinctura Conii.

Hemlock fruit, finely comminuted, ℥ 2½
Proof spirit, O 1.
} Made by maceration for 48 hours, and percolation.

Action.—1. The aromatic group of Umbelliferous fruits are mainly used as **flavouring** agents, and as **carminatives.**

Dose—Of Aquæ, fl ʒ 1 to 2.

2. Conium fruit has peculiar actions, similar to those of the leaves. (*See* Conium Leaves).

Dose—Of Tincture, ♏ 20 to 60.

C. Miscellaneous and Special Fruits.

Name.	Source.	Natural Order.
Anisi Stellati Fructus.	Illicium Anisatum.	Magnoliaceæ.
Belæ Fructus.	Ægle Marmelos.	Aurantiaceæ.
Capsici Fructus.	Capsicum Fastigiatum.	Solanaceæ.
Cassiæ Pulpa.	Cassia Fistula.	Leguminosæ.
Colocynthidis Pulpa.	Citrullus Colocynthis.	Cucurbitaceæ.
Cubeba.	Piper Cubeba.	Piperaceæ.
Ecballii Fructus.	Ecballium Elaterium.	Cucurbitaceæ.
Papaveris Capsulæ.	Papaver Somniferum.	Papaveraceæ.
Pimenta.	Pimenta Officinalis.	Myrtaceæ.
Piper Nigrum.	Piper Nigrum.	Piperaceæ.
Rosæ Caninæ Fructus.	Rosa Canina.	Rosaceæ.

The fruits above enumerated will now be individually considered.

1. Anisi Stellati Fructus—Star-Anise Fruit.—The dried fruit. From plants cultivated in China.

Description.—*a.* Is usually composed of eight fully developed carpels, diverging horizontally in a stellate manner from a short central, generally stalked axis.

b. Each carpel is boat-shaped, more or less beaked, irregularly wrinkled, of a rusty-brown colour, and commonly split, to expose—

c. A solitary seed, flattish, somewhat oblique, smooth, shining, reddish-brown.

d. Odour and taste closely resembling anise fruit.

PHARMACY.—This fruit is introduced into the B.P. as one of the sources of *Oleum Anisi.* (*See* OILS).

2. BELÆ FRUCTUS—BAEL FRUIT.—The dried half-ripe fruit.

DESCRIPTION.—*a.* Roundish; about the size of a large orange.

b. Usually imported in dried more or less twisted slices, or in fragments consisting of a portion of the rind, and adherent dried pulp and seeds.

c. Rind about $\frac{1}{8}$ of an inch thick, hard, and covered with a nearly smooth pale-brown or greyish firmly adherent epicarp; the pulp firm and brittle, and of an orange-brown or cherry-red colour externally, but when broken it is seen to be nearly colourless internally.

d. No odour; taste mucilaginous and very slightly acid.

PHARMACY.—*Officinal Preparation :—*

Extractum Belæ Liquidum.—Prepared by first making a watery extract of bael fruit, by successive macerations; pressing, and filtering the mixed liquids; evaporating; and adding rectified spirit when cold.

ACTION.—Bael fruit is an **astringent;** chiefly used in diarrhœa and dysentery.

Dose—Of Liquid Extract, fl 3 1 to 2.

3. CAPSICI FRUCTUS—CAPSICUM FRUIT.—The dried ripe fruit.

DESCRIPTION.—*a.* From about $\frac{1}{2}$ to $\frac{3}{4}$ of an inch long, and $\frac{1}{4}$ of an inch in diameter.

b. Somewhat shrivelled, oblong-conical, obtuse.

c. Composed of a smooth shining brittle thin translucent pericarp, of a dull orange-red colour, enclosing several small roundish or ovoid flat seeds.

d. Taste intensely pungent; odour peculiar and pungent. The powder of capsicum constitutes *cayenne pepper*.

PHARMACY.—*Officinal Preparation:*—

Tinctura Capsici.

Capsicum fruit, bruised, ʒ ¾
Rectified spirit, O 1.
} Made by maceration for 48 hours, and percolation.

ACTION.—Externally capsicum may be used as a **rubefacient.** Internally it is a **carminative** and **stimulant;** it is in common use as a **condiment.**

Dose—Of Tincture, ♏ 10 to 20.

4. CASSIÆ PULPA—CASSIA PULP.—The pulp obtained from the recently imported pods.

DESCRIPTION.—*a.* The pods are from 1½ to 2 feet long, and nearly an inch in diameter, blackish-brown, very hard, marked by two smooth longitudinal bands: divided internally by thin transverse partitions into numerous cells, each containing a seed, more or less surrounded by pulp, and hence the pods should not rattle when shaken.

b. The *pulp* is viscid, blackish-brown, sweet in taste, and somewhat sickly in odour. When obtained separately the pulp frequently contains the seeds and dissepiments; these should be removed before using it.

PHARMACY.—Cassia pulp is contained in Confectio Sennæ.

ACTION.—Cassia is a **laxative.**

5. COLOCYNTHIDIS PULPA—COLOCYNTH PULP.—The dried peeled fruit, freed from seeds.

DESCRIPTION.—*a.* Usually imported in more or less broken roundish balls, about 2 inches or less in diameter, consisting of the pulp in which the seeds are imbedded. The broken-up pulp freed from seeds is the condition in which it is officinal.

b. The pulp is very light, spongy, tough, and whitish.

c. No odour; taste intensely bitter.

d. The powder is not coloured by iodine; and does not yield oil when treated with ether, and the separated ether evaporated.

PHARMACY.—1. *Officinal Preparations:—*

a. Extractum Colocynthidis Compositum.—(i) Make a tincture by macerating Colocynth pulp, ℥ 6, in Proof spirit, C 1, for 4 days. Press, and distil off the spirit.

(ii) Add { Extract of socotrine aloes, ℥ 12; Resin of scammony, ℥ 4; Curd soap, in powder, ℥ 3.

(iii) Evaporate by a water-bath to a pilular consistence, adding Cardamom Seeds, in the finest powder, ℥ 1, towards the end of the process.

b. Pilula Colocynthidis Composita.

Colocynth pulp, 1
Barbadoes aloes, 2
Resin of scammony, 2
Sulphate of potassium, ¼
Oil of cloves, fl 3 2
Distilled water, a sufficiency.

} Mix the solids in powder, add the oil of cloves, and beat into a mass with water.

c. Pilula Colocynthidis et Hyoscyami.

Compound pill of colocynth, 2
Extract of henbane, 1.

} Beat into a uniform mass.

ACTION.—Colocynth is a **drastic purgative.**

Doses—Of Compound Extract, gr. 3 to 10; either Pill, gr. 5 to 10.

6. CUBEBA—CUBEBS.—The dried unripe full-grown fruit.

DESCRIPTION.—*a.* Globular, about $\frac{1}{6}$ of an inch in diameter, and tapering below into a rounded stalk, which is continuous with, and permanently attached to, the pericarp.

b. Blackish- or greyish-brown, much wrinkled. Beneath the shrivelled skin is a hard brown smooth shell, in which the seed is contained in the mature fruit, but is usually nearly empty.

c. Taste warm, aromatic, and somewhat bitter; odour strong, peculiar, aromatic.

d. A decoction when cold is coloured bright indigo-blue by solution of iodine.

PHARMACY.—*Officinal Preparations:*—

a. Oleo-resina Cubebæ. (*See* OLEO-RESINS).

b. Oleum Cubebæ. (*See* OILS).

c. Tinctura Cubebæ.

Cubebs, in powder, ℥ 2½
Rectified Spirit, O 1.
} Made by maceration for 48 hours, and percolation.

ACTION.—Cubebs is a **gastric stimulant** and **stomachic** in small doses, but in large doses it becomes an **irritant** to the alimentary canal. Its main use is as a **diuretic,** and for its **specific** action upon the genito-urinary mucous membrane, especially the urethra. It is also an **expectorant.** Cubebs may cause a cutaneous eruption.

Doses—Of Cubebs, gr. 30 to 120; Tincture, fl ℥ ½ to 2.

7. ECBALLII FRUCTUS — SQUIRTING CUCUMBER FRUIT.—The fruit, very nearly ripe. From plants cultivated in Britain. This fruit is not described in the B.P. and is merely introduced as the source of Elaterium.

8. PAPAVERIS CAPSULÆ—POPPY CAPSULES.—The nearly ripe dried capsules. From plants cultivated in Britain.

DESCRIPTION.—*a.* Roundish, ovoid-rounded, or somewhat oblong, suddenly contracted below into a neck, and crowned above by the stellately-arranged stigmas.

b. From 2 to 3 inches in diameter.

c. Externally yellowish or yellowish-brown, and frequently dotted with blackish spots.

d. Internally presents a variable number of thin, brittle parietal placentas, directed towards the centre of the cavity, and a very large number of loose, small, reniform, whitish, slate-coloured, or nearly black seeds.

e. Inodorous; taste slightly bitter.

PHARMACY.—*Officinal Preparations:*—

a. Decoctum Papaveris.

Poppy capsules, bruised, ℥ 2
Distilled water, O 1½.
} Boil for 10 minutes, strain, and make up to O 1.

b. Extractum Papaveris.—Prepared from Poppy capsules, freed from the seeds, and in No. 20 powder, by making a watery extract with boiling water by infusion, percolation, and evaporation; adding rectified spirit when cold; and in 24 hours filtering and evaporating to a pilular consistence.

c. Syrupus Papaveris.—Prepared from Poppy capsules, freed from the seeds, and in No. 20 powder, by infusing in boiling water and percolating; evaporating; when cold adding rectified spirit; filtering in 12 hours; distilling off the spirit, evaporating, and adding refined sugar.

ACTION.—The decoction of poppy is used locally as an **anodyne** fomentation. The preparations intended for internal administration have to a slight but uncertain degree the effects of opium. (*See* OPIUM). They are chiefly used as **hypnotics** and **pulmonary sedatives.**

Doses—Of Extract, gr. 2 to 5; Syrup, fl ℥ 1.

9. Pimenta—Pimento.—The dried unripe full-grown fruit.

Description.—*a.* Dry, light, roundish, $\frac{1}{5}$ of an inch or more in diameter, and crowned with the remains of the calyx, in the form commonly of a raised scar-like ring.

b. Pericarp roughened from the presence of oil-glands, brittle, dark-brown.

c. Two-celled, each cell containing a brownish-black, somewhat compressed, reniform seed.

d. Odour and taste warm, aromatic, and peculiar, but resembling cloves.

Pharmacy.—*Officinal Preparations:*—

a. Aqua Pimentæ.

Pimento, bruised, ℥ 14
Water, C 2
} Distil C 1.

b. Oleum Pimentæ. (*See* Oils).

Action.—Pimento is employed as a **flavouring** agent, **gastric stimulant,** and **carminative.** It is one of the **condiments.**

10. Piper Nigrum—Black Pepper.—The dried unripe fruit.

Description.—*a.* Roundish, usually about $\frac{1}{5}$ of an inch in diameter.

b. Pericarp thin, blackish-brown, wrinkled, and containing a hard smooth roundish seed, of a yellowish-brown or grey colour.

c. Aromatic odour; taste pungent and bitter.

Pharmacy.—1. *Officinal Preparation:*—

Confectio Piperis.

Black pepper, in fine powder, ℥ 2
Caraway fruit, in fine powder, ℥ 3
Clarified honey, ℥ 15.
} Rub well together in a mortar.

2. Black pepper is an ingredient in Confectio Opii and Pulvis Opii Compositus.

Action.—Pepper, locally applied, is a **rubefacient,** and is popularly employed for this purpose.

Internally it is in ordinary use as a **condiment,** and acts as a **sialagogue, gastric** and **intestinal stimulant,** and **carminative.** It is also believed to have some **specific** effect upon the mucous membrane of the rectum, as well as on that of the genito-urinary tract, similar to cubebs.

Dose—Of Confection, ʒ ı to 2.

ıı. Rosæ Caninæ Fructus—Fruit of the Dog-Rose.—The ripe fruit.

Description.—*a.* Ovoid or somewhat oval, ¾ of an inch or more long.

b. Scarlet or crimson; smooth and shining.

c. Inodorous; taste pleasant, sweetish, acidulous.

Pharmacy.—*Officinal Preparation:*—

Confectio Rosæ Caninæ.

Hips, deprived of their seed-like fruit, 1
Refined sugar, 2 } .

Beat the hips to a pulp, rub through a sieve, and mix with the sugar.

Action.—The confection of dog-rose fruit is used for making up pills. It is also somewhat **refrigerant** and **astringent.**

Group IX.—SEEDS.

The seeds recognised in the B.P. may be enumerated under the following divisions:—

A. Large Seeds.

Name.	Source.	Natural Order.
Amygdala Amara Amygdala Dulcis	Prunus Amygdalus. *Var.*, Amara et Dulcis	Rosaceæ.
Myristica	Myristica Fragrans	Myristicaceæ.
Nux Vomica	Strychnos Nux Vomica	Loganiaceæ.
Physostigmatis Semen	Physostigma Venenosum	Leguminosæ.

B. Small Seeds.

Cardamomi Semina	Elettaria Cardamomum	Zingiberaceæ.
Colchici Semina	Colchicum Autumnale	Melanthaceæ.
Hordeum Decorticatum	Hordeum Distichon	Graminaceæ.
Lini Semina	Linum Usitatissimum	Linaceæ.
Sabadilla	Schœnocaulon Officinale	Melanthaceæ.
Sinapis Albæ Semina	Brassica Alba	Cruciferæ.
Sinapis Nigræ Semina	Brassica Nigra	
Staphisagriæ Semina	Delphinium Staphisagria	Ranunculaceæ.
Stramonii Semina	Datura Stramonium	Atropaceæ.

C. Ground Seeds.

Farina Tritici	Triticum Sativum	Graminaceæ.
Lini Farina	Linum Usitatissimum	Linaceæ.
Sinapis	Brassica Alba et Nigra.	Cruciferæ.

While recognising these divisions it will be more convenient to consider the several drugs in detail in alphabetical order.

1. { Amygdala Amara—Bitter Almond.
   { Amygdala Dulcis—Sweet or Jordan Almond.

The ripe seed.

Description.—The appearance of almonds is well-known, but the following points may be noted:—

a. Sweet almond is about an inch or somewhat more in length, nearly oblong, more or less compressed, pointed at one end and rounded at the other. Bitter almond is broader and shorter.

b. Both varieties have a cinnamon-brown scurfy coat, easily removed by steeping in warm water (*blanched almonds*).

c. The kernel forms a white emulsion when triturated with water.

d. The emulsion of sweet almond has no marked odour, but a bland sweet nutty taste. That of

bitter almond has an odour like that of ratafia or peach-blossoms, and a very bitter taste.

PHARMACY.—*Officinal Preparations.*—From almonds directly the following are obtained:—

a. Oleum Amygdalæ.—A fixed oil obtained by expression from both varieties of almonds. (*See* OILS).

b. Pulvis Amygdalæ Compositus.

Sweet almonds, blanched and dried, 8
Refined sugar, 4
Gum acacia, 1

Rub the almonds to a smooth consistence; add the sugar and gum gradually; rub the whole to a coarse powder.

From this preparation is made:—

c. Mistura Amygdalæ.

Compound powder of almonds, 1
Distilled water, 8.

Triturate, and strain through muslin.

ACTION.—Sweet almond is **demulcent** and **nutritive.** The mixture constitutes a pleasant vehicle for administering other drugs. The bitter almond is poisonous, as it yields when moistened *oil of bitter almonds*, which contains hydrocyanic acid; it is officinal merely as a source of the fixed oil.

Dose—Of Mixture, fl ℥ 1 to 2.

2. CARDAMOMI SEMINA—CARDAMOMS.—The dried ripe seeds. They are best kept in their pericarps, as imported, but when required for use they should be separated and the pericarps rejected.

DESCRIPTION.—*a.* About $\frac{1}{6}$ of an inch long, irregularly angular, transversely wrinkled.

b. Dark reddish-brown externally, whitish within.

c. Odour and taste agreeably warm and aromatic.

PHARMACY.—1. *Officinal Preparation :—*
Tinctura Cardamomi Composita.

Cardamom seeds, bruised,	℥ 1¼	Made by maceration for 48 hours, and percolation.
Caraway fruit, bruised,	℥ 1¼	
Raisins, freed from seeds,	℥ 2	
Cinnamon bark, bruised,	℥ ½	
Cochineal, in powder,	gr. 55	
Proof spirit,	O 1.	

2. *Cardamoms* are contained in Extractum Colocynthidis Compositum, Pulvis Cinnamomi Compositus, Pulvis Cretæ Aromaticus, Pulvis Cretæ Aromaticus cum Opio, Tinctura Gentianæ Composita, Tinctura Rhei, and Vinum Aloes.

The *tincture* is an ingredient in Decoctum Aloes Compositum, Mistura Ferri Aromatica, Mistura Sennæ Composita, and Tinctura Chloroformi Composita.

ACTION.—Cardamoms act as a **stimulant** and **carminative.**

Dose—Of Tincture, fl ℥ ½ to 2.

3. COLCHICI SEMINA—COLCHICUM SEEDS.—The seeds collected when fully ripe, commonly about the end of July or beginning of August, and carefully dried.

DESCRIPTION.—*a.* About ⅙ of an inch in diameter, sub-globular, slightly pointed at the hilum.

b. Reddish-brown; somewhat rough.

c. Very hard and difficult to powder.

d. No odour; taste bitter and acrid.

PHARMACY.—*Officinal Preparation :—*
Tinctura Colchici Seminum.

Colchicum seeds, finely comminuted,	℥ 2½	Made by maceration for 48 hours, and percolation.
Proof spirit,	O 1.	

ACTION.—The tincture of colchicum seeds acts as a **diaphoretic, diuretic, hepatic stimulant,** and **alterative ;** having a **specific** effect in rela-

tion to gout. In full doses it becomes an **irritant** to the alimentary canal, and **vascular depressant.**

Dose—Of Tincture, ℥ 10 to 30.

4. Farina Tritici—Wheaten Flour.—The grain ground and sifted. Used for making *Cataplasma Fermenti.*

5. Hordeum Decorticatum—Pearl Barley.—The dried seed, divested of its integuments. From plants cultivated in Britain. White, rounded with a trace of the longitudinal furrow, in which are the remains of the yellowish-brown integuments. Taste and odour farinaceous.

Pharmacy.—*Officinal Preparation :—*

Decoctum Hordei.

Pearl Barley, ℥ 2
Distilled water, O 1½.
} Wash the barley in cold water; boil for 20 minutes; and strain.

Action.—The decoction of barley is used as a **demulcent** drink. Barley is also a **nutrient.**

Dose—Of Decoction, fl ℥ 1 to 4.

6. { Lini Semina—Linseed.—The dried ripe seeds.
{ Lini Farina—Linseed Meal.—Linseed reduced to powder.

Description.—*a.* The seeds are small, from ¼ to ⅙ of an inch long, more or less flattened, ovoid, somewhat obliquely pointed.

b. Externally brown, smooth, shining; internally yellowish-white.

c. No odour; oily and mucilaginous taste.

d. A decoction of linseed when cold is not made blue by solution of iodine.

Pharmacy.—1. *Officinal Preparations :—*

a. Cataplasma Lini.

Linseed meal, ℥ 4
Boiling water, fl ℥ 10.
} Mix with constant stirring.

b. Infusum Lini.

Linseed, gr. 150 Dried liquorice root, in powder, gr. 50 Boiling distilled water, fl ʒ 10.	Infuse for two hours, and strain.

c. Oleum Lini.—The oil expressed from linseed. (*See* Oils).

2. *Linseed meal* is an ingredient in several Cataplasms.

3. *Incompatibles.*—The infusion of linseed is incompatible with preparations of lead, iron, and most metallic salts.

Action.—Linseed-meal poultice is used externally as an **emollient** and **anodyne**; internally linseed acts as a **demulcent** and **diluent** in the form of infusion.

7. Myristica—Nutmeg.—The dried seed divested of its hard coat or shell.

Description.—*a.* Oval or roundish; varying in length, but rarely exceeding an inch.

b. Externally greyish-brown, and marked with reticulated furrows; internally greyish-red, with darker brownish-red veins, the transverse section having a marbled appearance.

c. Odour strong, and pleasantly aromatic; taste agreeably aromatic, warm, and bitterish.

Pharmacy.—1. *Officinal Preparations:*—

a. Oleum Myristicæ.—A volatile oil. (*See* Oils).

b. Oleum Myristicæ Expressum.—A concrete oil. (*See* Oils).

2. *Nutmeg* is an ingredient in Pulvis Catechu Compositus, Pulvis Cretæ Aromaticus, Pulvis Cretæ Aromaticus cum Opio, Spiritus Armoraciæ Compositus, and Tinctura Lavandulæ Composita.

Action.—Nutmeg is a **carminative** and **stimulant.** It is a **condiment** in common use.

8. Nux Vomica.—The seeds.

Description.—*a.* Rounded in outline; from about $\frac{7}{8}$ of an inch to more than an inch in diameter, and on an average nearly $\frac{1}{4}$ of an inch thick; flattish, or concavo-convex, or sometimes more or less bent or irregular in form; rounded or somewhat acute at the margin; marked on one surface by a central scar or hilum, from which a more or less projecting line passes to the margin, where it terminates in a slight prominence.

b. Externally ash-grey or yellowish-grey-green, and glistening from being covered with short satiny hairs; internally horny and somewhat translucent.

c. No odour; extremely bitter taste.

Pharmacy.—1. *Officinal Preparations:*—

a. Extractum Nucis Vomicæ.—This extract is made by heating the split Nux Vomica seeds to 212° for 3 hours, and reducing to fine powder; macerating and percolating this with a mixture of rectified spirit and distilled water (4 to 1); distilling off the spirit, and evaporating over a water-bath. The amount of total alkaloid in the percolated liquid is estimated by a certain process (*see* B.P., p. 163), and such quantity taken as will leave an extract containing 15 per cent. of total alkaloid.

b. Tinctura Nucis Vomicæ.

Extract of nux vomica, gr. 133
Distilled water, fl ℥ 4
Rectified spirit, sufficient to produce fl ℥ 20.
} Dissolve.

A fluid-ounce contains gr. 1 of the alkaloids of nux vomica.

2. Nux Vomica is the source of *Strychnine.* (*See* Alkaloids).

Action.—Nux Vomica owes its properties to the strychnine which it contains, and its effects are similar to those of this alkaloid. (*See* Strychnina).

Its preparations are mainly employed, however, as **stomachic** and **general tonics**; and as **intestinal tonics**, thus acting as aids to purgatives. Given beyond a certain point they become **spinal excitants** and **tetanizers**, and produce all the poisonous effects of strychnine.

Doses—Of Extract, gr. $\frac{1}{4}$ to 1; Tincture, ♏ 10 to 20.

9. Physostigmatis Semen—Calabar Bean.—The dried seeds.

Description.—*a*. From about 1 to $1\frac{1}{4}$ inch long, $\frac{3}{4}$ of an inch broad, and $\frac{1}{2}$ an inch or somewhat more in thickness.

b. Oblong and more or less reniform, and with a long broad blackish furrow running entirely along its convex side.

c. Testa hard, brittle, roughish, deep chocolate-brown or brownish-red, and enclosing a closely-adhering nucleus, which principally consists of two hard white brittle cotyledons, separated from each other by a somewhat large cavity.

d. Inodorous; no marked taste beyond that of an ordinary bean.

e. Yields its virtues to alcohol, and imperfectly to water. The cotyledons when moistened with solution of potash acquire a permanent yellow colour.

Pharmacy.—*Officinal Preparations*:—

a. *Extractum Physostigmatis*.—A *spirituous extract*, made from Calabar Bean, in No. 40 powder, and rectified spirit, by maceration and percolation; distilling off most of the spirit; and evaporating to the consistence of a soft extract.

b. *Physostigmine* is obtained from the *extract*. (*See* Alkaloids).

Action.—Calabar bean, both locally applied and internally administered, is a **myotic.** Internally, it is used mainly as a **spinal sedative** and **depressant**; but it also acts as an **irritant** to the alimentary canal in full doses, a **cardiac depressant,** and a **respiratory depressant.**

Doses—Of Calabar Bean, gr. 1 to 4; Extract, gr. $\frac{1}{16}$ to $\frac{1}{4}$.

10. Sabadilla—Cevadilla.—The dried ripe seeds. The seeds are sometimes imported in, or mixed with, their pericarps, but these should be rejected before the seeds are used.

Description.—*a.* About $\frac{1}{4}$ of an inch or less in length; narrow, fusiform or somewhat scimitar-shaped, prolonged above into a membranous wing, somewhat compressed.

b. Shining, wrinkled, blackish-brown.

c. Taste bitter, acrid; inodorous, but when powdered producing violent sneezing.

Pharmacy.—Sabadilla is merely introduced into the B.P. as the source of *Veratrine.* (*See* Alkaloids).

11. Sinapis Albæ Semina—White Mustard Seeds. Sinapis Nigræ Semina—Black Mustard Seeds. The dried ripe seeds. From plants cultivated in Britain.
Sinapis—Mustard.—Black and white mustard seeds, powdered and mixed.

Description.—The characters of the two varieties of mustard seeds may be thus summed up:—

a. Both are roundish, but the *black* are scarcely half the size of the *white,* which measure about $\frac{1}{12}$ of an inch in diameter.

b. Externally they are finely-pitted, the *white* having a pale-yellow colour, and the *black* being dark-reddish or greyish-brown. Both are yellow internally, and hard.

c. White mustard is inodorous; taste pungent. *Black* mustard is inodorous when dry, even when powdered, but when triturated with water it exhales a strong pungent odour, so as to affect the eyes; taste very pungent.

TEST.—A decoction of mustard when cooled is not made blue by tincture of iodine.

PHARMACY.—*Officinal Preparations:*—

a. Cataplasma Sinapis.

Mustard, in powder, ℥ 2½, or a sufficiency
Linseed meal, ℥ 2½
Boiling water } of each a sufficiency
Water }

Mix the mustard with two or three ounces of luke-warm water; mix the linseed meal with six or eight ounces of boiling water; add the former to the latter, and stir them together.

b. Charta Sinapis.—This is made by mixing Mustard with Solution of Gutta Percha; covering strips of cartridge paper with a thin coating of the mixture; and drying them by exposure to air.

c. Oleum Sinapis.—The oil distilled with water from *black* mustard seeds. (*See* OILS).

ACTION.—Mustard applied externally is a most valuable **rubefacient** or **vesicant.** Internally it is employed as a **condiment;** and in doses of from 1 to 4 teaspoonfuls mixed with warm water it acts as a useful and handy **stimulant emetic.**

12. STAPHISAGRIÆ SEMINA—STAVESACRE SEEDS.—The dried ripe seeds.

DESCRIPTION.—*a.* Irregularly triangular or obscurely quadrangular, arched.

b. Blackish-brown when fresh, but becoming dull greyish-brown by keeping. Testa wrinkled and deeply-pitted; nucleus soft, whitish, oily.

c. No marked odour; taste nauseously bitter and acrid.

PHARMACY.—*Officinal Preparation :—*

Unguentum Staphisagriæ.

Stavesacre seeds, 1 } Crush the seeds, and
Benzoated lard, 2. } macerate them in the lard kept melted over a water-bath for 2 hours. Strain through calico, and set aside to cool.

This ointment contains about 10 per cent. of oil of stavesacre.

ACTION.—The ointment of stavesacre is merely used as a **parasiticide,** to destroy pediculi.

13. STRAMONII SEMINA—STRAMONIUM SEEDS.—The dried ripe seeds.

DESCRIPTION.—*a.* About $\frac{1}{6}$ of an inch long ; reniform, flattened.

b. Brownish-black, finely-pitted, wrinkled.

c. Odour disagreeable when bruised; taste bitterish.

PHARMACY. —*Officinal Preparations :—*

a. Extractum Stramonii.—Made by first percolating Stramonium Seeds, in No. 40 powder, with *washed ether* to *remove the oil ;* and then slowly percolating the residue with proof spirit until the powder is exhausted; distilling off most of the spirit ; and evaporating the residue by a water-bath to a pilular consistence.

b. Tinctura Stramonii.

Stramonium seeds, bruised, ℥ $2\frac{1}{2}$ } Made by maceration for
Proof spirit, O 1. } 48 hours, and percolation.

ACTION.—Stramonium has similar actions to belladonna (**mydriatic, cerebral excitant, narcotic, anodyne,** etc.), but is almost solely used as a **pulmonary sedative.** The leaves, although non-officinal, are smoked for this purpose.

Doses—Of Extract, gr. $\frac{1}{4}$ to $\frac{1}{2}$; Tincture, ♏ 10 to 30.

Group X.—SPECIAL PARTS OF PLANTS.

Under this group may be considered a few drugs which are botanically peculiar.

1. Colchici Cormus—Colchicum Corm. Colchicum Autumnale. *N.O. Melanthaceæ.*

a. The fresh corm, collected about the end of June or beginning of July.

b. The same, stripped of its coats, sliced transversely, and dried under 150°.

Description.—1. *Fresh Corm.*

a. About 1½ inch long, and an inch broad.

b. Somewhat conical, flattened on one side, where it has a new corm in process of development, and rounded on the other.

c. Covered with an outer thin brown membranous coat, and an inner one reddish-yellow.

d. Internally white and solid, and when cut yielding a milky juice of a bitter taste and disagreeable odour.

2. *Dried Slices.*

a. Slices are ⅛ or $\frac{1}{10}$ of an inch thick; moderately indented on one side and convex on the other, so that they are somewhat reniform in outline.

b. Yellowish at the circumference; surfaces firm, whitish, amylaceous; breaking readily with a short fracture.

c. Taste bitter; no odour.

Pharmacy.—*Officinal Preparations:*—

a. Extractum Colchici.—Made from the pressed out juice of *fresh* Colchicum Corms, deprived of their coats and crushed, by allowing the feculence to subside, heating the clear liquor to 212°, straining through flannel, and evaporating by a water-bath under 160° to a pilular consistence.

b. Extractum Colchici Aceticum.—This preparation is made by a similar process to the above, but before pressing out the juice, Acetic Acid, fl ℥ 6, is added to the crushed corms, ℔ 7.

c. Vinum Colchici.

Dried sliced colchicum corm, in No. 20 powder, ℥ 4
Sherry wine, O 1.
} Macerate for 7 days; press and strain through calico; and make up to O 1.

Action.—The preparations of colchicum corm are much more frequently used than that of the seeds, and have similar actions, namely, **diaphoretic, diuretic, hepatic stimulant,** and **alterative** in relation to gout, in ordinary doses; they are also **irritant** to the alimentary canal, and **vascular depressant,** in large doses.

Doses—Of Powdered Corm, gr. 2 to 8; either Extract, gr. ½ to 2; Wine, ♏ 10 to 30.

2. Jalapa—Jalap. Ipomœa Purga. *N.O. Convolvulaceæ.* The dried tubercules.

Description.—*a.* Irregularly oblong, somewhat ovoid, napiform, or rarely fusiform; varying much in size, the larger frequently incised, or cut into halves or quarters.

b. Externally dark-brown, more or less irregularly furrowed and wrinkled, and marked with paler-coloured transverse lines or scars; internally dirty-yellowish or brownish, and frequently marked with dark-brown irregular concentric circles. Hard and compact in texture.

c. Odour faint, peculiar, and smoky, increased by rubbing or powdering; taste sweetish, acrid, and nauseous.

TEST.—Treated as for the preparation of Resin of Jalap, not less than 10 per cent. of the resin should be obtained, of which not more than $\frac{1}{10}$ should be soluble in ether.

PHARMACY.—1. *Officinal Preparations:—*

a. Extractum Jalapæ.—Prepared by first making a tincture with rectified spirit, by macerating Jalap, in coarse powder, for 7 days, pressing, and filtering; distilling off the spirit, leaving a soft extract; making a soft watery extract with the residual jalap; mixing the two; and evaporating under 140° to a pilular consistence.

b. Pulvis Jalapæ Compositus.

Jalap, in powder, 5
Acid tartrate of potassium, 9 } Mix thoroughly,
Ginger, in powder, 1.

pass the powder through a fine sieve, and rub lightly in a mortar.

c. Jalapæ Resina. (*See* RESINS).

d. Tinctura Jalapæ.

Jalap, in No. 40 powder, ℥ 2½ } Made by maceration for 48 hours, and percolation.
Proof spirit, O 1.

2. *Jalap* is an ingredient in Pulvis Scammonii Compositus.

ACTION.—Jalap is a **simple purgative;** it is also used as a **vermifuge.**

Doses—Of Jalap, gr. 10 to 30; Extract gr. 5 to 15; Compound Powder, gr. 20 to 60; Tincture, fl ʒ ½ to 2.

3. SCILLA — SQUILL. URGINEA SCILLA. *N.O. Liliaceæ.* The bulb, divested of its dry membranous outer scales, cut into slices, and dried.

DESCRIPTION.—*a.* Slices are flattish or somewhat four-sided, curved; from about 1 to 2 inches long.

b. Yellowish-white or somewhat pinkish; translucent.

c. Brittle, and easily powdered if *very dry*, but tough and flexible when moist.

d. No odour; taste disagreeably bitter.

PHARMACY.—1. *Officinal Preparations.*—The preparations made directly from squill are:—

a. Acetum Scillæ.

Squill, bruised, ℥ 2½
Diluted acetic acid, O 1. } Macerate 7 days, strain, press, and filter.

b. Pilula Scillæ Composita.

Squill, 1¼
Ginger, 1
Ammoniacum, 1
Hard soap, 1. } Mix the solid ingredients in powder, add sufficient treacle, and beat into a uniform mass.

c. Tinctura Scillæ.

Squill, bruised, ℥ 2½
Proof spirit, O 1. } Made by maceration for 48 hours, and percolation.

The following are made from *Acetum Scillæ*:—

d. Oxymel Scillæ.

Vinegar of squill, O 1
Clarified honey, lb 2. } Mix, and evaporate by a water-bath to sp. gr. 1·32 when cold.

e. Syrupus Scillæ.

Vinegar of squill, O 1
Refined sugar, lb 2½. } Dissolve with the aid of a little heat.

2. *Squill* is also an ingredient in Pilula Ipecacuanhæ cum Scillâ.

ACTION.—Squill is a **diuretic, stimulant expectorant,** and **cardiac tonic.** In large doses it acts as an **emetic** and **irritant** to the alimentary canal.

Doses—Of Squill, in powder, gr. 1 to 3; Vinegar, ♏ 15 to 40; Oxymel or Syrup, fl ʒ ½ to 1; Compound Pill, gr. 5 to 10; Tincture, ♏ 10 to 30.

Group XI.—DISEASED PLANTS.

1. Ergota — Ergot. *N.O. Graminaceæ.* The sclerotium of *Claviceps purpurea* (a fungous growth), produced between the pales, and replacing the grain of *Secale cereale*—the *Common Rye.*

Description.—*a.* Sub-cylindrical or obscurely triangular, tapering towards the ends, generally arched or curved; longitudinally furrowed on each side, but more especially on that which is concave, and often irregularly cracked.

b. From $\frac{1}{3}$ to $1\frac{1}{2}$ inch in length.

c. Violet-purple externally, white or pinkish-white within; fracture short.

d. Odour peculiar and disagreeable, especially if the powder be triturated with solution of potash; taste mawkish and rancid.

Pharmacy.—*Officinal Preparations:*—

a. Extractum Ergotæ Liquidum.—Made by twice digesting crushed ergot in distilled water; pressing, straining, and evaporating the liquors by a water-bath to a certain quantity; when cold adding rectified spirit; and filtering after standing an hour.

b. Infusum Ergotæ.

Ergot, crushed, ℥ $\frac{1}{4}$
Boiling distilled water, fl ℥ 10.
} Infuse $\frac{1}{2}$ an hour, and strain.

c. Tinctura Ergotæ.

Ergot, finely comminuted, ℥ 5
Proof spirit, O 1.
} Made by maceration for 48 hours, and percolation.

d. Ergotine is made from the Liquid Extract. (*See* Ergotine).

Action.—Ergot is chiefly used as an **ecbolic** and **hæmostatic.** It is a powerful **vaso-contractor,** and thus gives rise to various phenomena. It has been employed to check different secretions, as the urine, sweat, and milk.

Doses—Of Ergot, gr. 20 to 30; Liquid Extract, ♏ 10 to 30; Infusion, fl ʒ 1 to 2; Tincture, ♏ 5 to 30.

2. Galla—Galls. *N.O. Cupuliferæ.* Excrescences on *Quercus Lusitanica* or *Infectoria,* caused by the puncture and deposit of an egg or eggs of *Cynips Gallæ tinctoriæ*—an insect.

Description.—*a.* Sub-globular, tuberculated on the surface, the tubercles and intervening spaces being smooth. Hard and heavy.

b. From ½ to ¾ of an inch or more in diameter.

c. Dark bluish-green or dark olive-green externally; yellowish or brownish-white internally, with a small central cavity.

d. No odour; taste intensely astringent, followed by some degree of sweetness.

Pharmacy.—1. *Officinal Preparations:*—

a. Tinctura Gallæ.

Galls, in No. 40 powder, ʒ 2½
Proof spirit, O 1.
} Made by maceration for 48 hours, and percolation.

b. Unguentum Gallæ.

Galls, in fine powder, gr. 80
Benzoated lard, ʒ 1.
} Mix thoroughly.

c. Unguentum Gallæ cum Opio.

Ointment of galls, ʒ 1
Opium, in powder, gr. 32.
} Mix thoroughly.

2. *Galls* are the source of Acidum Gallicum and Acidum Tannicum.

3. *Incompatibles.*—Mineral acids; alkaline carbonates; lime-water; salts of iron, lead, copper,

and silver; tartar-emetic; ipecacuanha, opium, infusions of cinchona, calumba, and cusparia.

Action.—The preparations of galls are powerfully **astringent,** and are chiefly employed locally for this purpose. The tincture may be administered internally.

Dose—Of Tincture, fl 3 ½ to 2.

Group XII.—VEGETABLE PRODUCTS.

I include in this group drugs which are not parts of plants, but obtained or prepared from these in different ways, and they naturally arrange themselves under certain well-recognised subdivisions.

A. Gums.

Gums are exudations from the stems of plants, which form a *mucilage* when mixed with water. They consist of *arabine,* which is soluble, and *bassorine,* which is insoluble, but swells up into a gelatinoid mass, these being combined with magnesium and potassium to form salts.

1. Acaciæ Gummi—Gum Acacia. Acacia Senegal and other species. *N.O. Leguminosæ.* A gummy exudation from the stem and branches.

Description and Tests.—*a.* In roundish, ovoid, or vermicular tears, or masses, of various sizes; or in angular fragments with glistening surfaces.

b. Colourless, or with a yellowish, brownish, or reddish tint. The tears either opaque, from numerous minute fissures, and very brittle, or more or less transparent and not readily broken; the fractured surfaces vitreous in appearance.

c. Taste bland and mucilaginous; no odour.

d. Insoluble in alcohol, entirely soluble in water, forming a clear mucilaginous solution.

e. The aqueous solution forms with subacetate of lead an opaque white jelly. If an aqueous solution of iodine be added to the powder, or to a solution formed with boiling water and cooled, there is no appearance of a violet or blue colour.

PHARMACY.—1. *Officinal Preparation:—*

Mucilago Acaciæ.

Gum acacia, in small pieces, ℥ 4 Distilled water, fl ℥ 6.	Dissolve with frequent stirring; strain through muslin, if necessary.

2. *Gum Acacia* is contained in Mistura Cretæ, Mistura Guaiaci, Pulvis Amygdalæ Compositus, Pulvis Tragacanthæ Compositus, and all the Trochisci. The *Mucilage* is also present in the Trochisci, with one exception, namely, T. Opii.

3. *Incompatibles.*—Sulphuric acid; alcohol; borax; persalts of iron; and subacetate of lead.

ACTION.—Gum Acacia is **demulcent** and **nutrient.** It is chiefly used for pharmaceutical purposes.

2. TRAGACANTHA — TRAGACANTH. ASTRAGALUS GUMMIFER, and some other species. *N.O. Leguminosæ.* A gummy exudation obtained by making incisions in the stem.

DESCRIPTION AND TESTS.—*a.* In flaky pieces, of varying length and breadth; thin; irregularly oblong or roundish; more or less curved, marked on the surface by arched or concentric ridges.

b. White or yellowish; somewhat translucent.

c. Tough, but more pulverizable when heated to 120°.

d. Very sparingly soluble in cold water, but swells into a gelatinous mass, which is tinged violet or blue by tincture of iodine.

e. Inodorous; and almost tasteless.

f. After maceration in cold water, the fluid portion is not precipitated by the addition of rectified spirit.

PHARMACY.—1. *Officinal Preparations:*—

a. Glycerinum Tragacanthæ.

Tragacanth, in powder, gr. 110
Glycerine, fl ʒ 1
Distilled water, fl gr. 74.
} Mix the tragacanth and glycerine in a mortar, add the water, and rub until a translucent homogeneous jelly is produced.

b. Mucilago Tragacanthæ.

Tragacanth, powdered, gr. 60
Distilled water, fl ʒ 10
Rectified spirit, fl ʒ 2.
} Mix the tragacanth with the spirit; then pour in the water, with constant agitation.

c. Pulvis Tragacanthæ Compositus.

Tragacanth, in powder
Gum acacia, in powder
Starch, in powder
} of each, 1
Refined sugar, in powder, 3.
} Rub well together.

2. Tragacanth is an ingredient in Confectio Opii, Confectio Sulphuris, and Pulvis Opii Compositus.

ACTION.—Tragacanth is a **demulcent.** It is chiefly used pharmaceutically, for the purpose of suspending heavy insoluble powders in liquids.

Dose—Of Compound Powder, gr. 20 to 60.

B. RESINS.

Resins are more or less solid substances, usually brittle, not volatilized by heat, insoluble in water, soluble in rectified spirit.

1. ELEMI—MANILLA ELEMI. Botanical source undetermined, but is referred to CANARIUM COMMUNE. *N.O. Amyridaceæ.* A concrete resinous exudation.

Description and Tests.—*a.* When fresh, soft, granular, resinous, and colourless; but by keeping becomes harder, and of a pale-yellow tint.

b. Odour strong and fragrant, somewhat resembling fennel and lemon.

c. Moistened with rectified spirit, it breaks up into small particles, which, when examined by the microscope, are seen partly to consist of acicular crystals.

Pharmacy.—*Official Preparation :—*

Unguentum Elemi.

Elemi, ℥ 1¼ Simple ointment, ℥ 1.	Melt, strain through flannel, and stir until the ointment solidifies.

Action.—Elemi is only used as an **external stimulant.**

2. Guaiaci Resina—Guaiacum Resin. Guaiacum Officinale and Sanctum. *N.O. Zygophyllaceæ.* The resin obtained from the stem by natural exudation, by incision, or by heat.

Description and Tests.—*a.* In roundish or somewhat oval tears, or more commonly in large masses containing fragments of bark, wood, and other impurities.

b. Brownish or greenish-brown externally, and, when the surface has been rubbed and exposed to air and light, covered with a green powder.

c. Brittle, breaking with a clean glassy fracture; thin splinters are transparent and greenish-brown.

d. Powder greyish, but by exposure becoming green.

e. Odour somewhat balsamic; when chewed leaves an acrid sensation in the throat.

f. A solution in rectified spirit strikes a clear blue colour when applied to the inner surface of a paring of raw potato.

PHARMACY.—1. *Officinal Preparations*:—

a. Mistura Guaiaci.

Guaiacum resin, Refined sugar } of each, ℥ 3 ½
Gum acacia, powdered, ℥ 3 ¼
Cinnamon water, O 1.

Triturate together, gradually adding the cinnamon water.

b. Tinctura Guaiaci Ammoniata.

Guaiacum resin, in powder, ℥ 4
Aromatic spirit of ammonia, a sufficiency

Macerate in fl ℥ 15 for 7 days, with occasional agitation, and filter; make up to O 1.

2. *Guaiacum resin* is contained in Pilula Hydrargyri Subchloridi Composita.

3. *Incompatibles.*—Mineral acids; spirit of nitrous ether.

ACTION.—Guaiacum resin is a **local stimulant** to the mouth and throat, and a **sialagogue.** On the alimentary canal it acts as more or less of a **stimulant** or **irritant,** and has been employed as a **purgative.** Remotely it is a **diaphoretic, diuretic, hepatic stimulant,** and **alterative,** being especially used in certain forms of gout and rheumatism.

Doses—Of Resin, gr. 10 to 30; Mixture, fl ℥ ½ to 2; Ammoniated Tincture, fl 3 ½ to 1.

3. JALAPÆ RESINA—RESIN OF JALAP.—The resin obtained from jalap.

PREPARATION.—Digest for 24 hours, heating gently, Jalap, in No. 40 powder, ℥ 8; Rectified spirit, fl ℥ 16, and afterwards thoroughly percolate with spirit. Add to the tincture distilled water, fl ℥ 4, and distil off the spirit by a water-bath. Remove the residue while hot to an open dish, and allow it to become cold. Pour off the supernatant fluid, wash the resin two or three times with hot water, and dry on a porcelain plate by the heat of a stove or water-bath.

Description and Tests.—*a.* In dark-brown opaque fragments, translucent at the edges.

b. Brittle, breaking with a resinous fracture.

c. Readily reduced to a pale-brown powder.

d. Sweetish odour; acrid in the throat.

e. Insoluble in oil of turpentine; easily soluble in rectified spirit. The powder yields little or nothing to warm water, and not more than 10 per cent. to ether.

Pharmacy.—Jalap resin is contained in Pilula Scammonii Composita.

Action.—Resin of jalap is a **drastic purgative.**

Dose—gr. 2 to 5.

4. Mastiche—Mastich. Pistacia Lentiscus. *N.O. Anacardiaceæ.* A concrete resinous exudation obtained by making incisions in the bark of the stem and large branches.

Description and Tests.—*a.* In rounded, irregular, oblong, or pear-shaped tears.

b. Pale-yellow colour, and either opaque and dusty on their outer surface, or far more frequently having a glassy and transparent appearance.

c. Brittle, and breaking with a vitreous, conchoidal, pale-yellow fracture.

d. Odour agreeable, somewhat balsamic and terebinthinous; taste mild and resinous; becoming plastic when chewed.

e. Entirely soluble in ether.

Action.—Mastiche is a **stimulant,** but is now only used for temporarily stopping teeth, and as a **masticatory.** Pharmaceutically it is sometimes employed to divide active ingredients in pills.

5. Podophylli Resina—Resin of Podophyllum.

Preparation.—Resin of podophyllum is prepared from Podophyllum rhizome, in No. 40 powder, by exhausting it by percolation with rectified spirit;

distilling off the greater part of the spirit; slowly pouring the remains into three times its volume of water, constantly stirring; allowing the mixture to stand for 24 hours to deposit the resin; washing it on a filter with distilled water; and drying in a stove.

DESCRIPTION AND TESTS.—*a.* An amorphous powder, varying in colour from pale-yellow to deep orange-brown.

b. Soluble in rectified spirit, and in ammonia.

c. Precipitated from the former solution by water, from the latter by acids. Partly soluble in pure ether.

PHARMACY.—*Officinal Preparation:*—

Tinctura Podophylli = gr. 1 of resin in fl ʒ 1.

Resin of podophyllum, gr. 160 } Dissolve and
Rectified spirit, O 1. } filter.

ACTION.—Podophyllum is a **drastic purgative,** and **hepatic stimulant.**

Doses—Of Resin, gr. ¼ to 1; Tincture, ♏ 15 to fl ʒ 1.

6. RESINA—RESIN. Various species of PINUS. *N.O. Coniferæ.* The residue left after the distillation of the oil of turpentine from the crude oleo-resin (turpentine).

DESCRIPTION AND TESTS.—*a.* Translucent, yellowish, compact, brittle, pulverisable; fracture shining.

b. Odour and taste faintly terebinthinate.

c. Easily fusible, and burns with a dense yellow flame and much smoke.

PHARMACY.—1. *Officinal Preparations:*—

a. Emplastrum Resinæ.

Resin, ʒ 4 }
Lead plaster, ℔ 2 } Melt the lead plaster, add the resin and soap, previously liquefied, and mix.
Curd soap, ʒ 2. }

b. Unguentum Resinæ.

Resin, in coarse powder, ʒ 8	Melt at a low temperature, strain through flannel while hot, and stir constantly till cool.
Yellow wax, ʒ 4	
Simple ointment, ʒ 16	
Almond oil, fl ʒ 2.	

2. *Resin* or its *plaster* is present in several of the Emplastra. It is also an ingredient in Charta Epispastica, and Unguentum Terebinthinæ.

Action.—Resin is an **external stimulant.**

7. Scammoniæ Resina—Resin of Scammony.

Preparation.—Scammony resin is prepared from Scammony Root, by digesting it in coarse powder with rectified spirit, moderately heated; percolating until the root is exhausted; adding the tincture to water, and distilling off the spirit; cooling the residue in an open dish; pouring off the supernatant fluid; washing the resin with hot water; and drying it on a porcelain plate with the heat of a stove or water-bath. It may also be prepared from Scammony.

Description and Tests.—*a.* In brownish translucent pieces, brittle, resinous in fracture.

b. Of a sweet and fragrant odour if prepared from the root.

c. It cannot alone form an emulsion with water. Ether dissolves it entirely.

d. The tincture does not render the fresh-cut surface of a potato blue (absence of guaiacum resin).

Pharmacy.—1. *Officinal Preparations:*—

a. Confectio Scammonii.

Resin of scammony, in powder, ʒ 6	Rub the powders with the syrup and honey into a uniform mass, add the oils, and mix.
Ginger, in fine powder, ʒ 3	
Oil of caraway, fl ʒ ¼	
Oil of cloves, fl ʒ ⅛	
Syrup, fl ʒ 6	
Clarified honey, ʒ 3.	

b. Pilula Scammonii Composita.

Resin of scammony, ʒ 1
Resin of jalap, ʒ 1
Curd soap, in powder, ʒ 1
Strong tincture of ginger, fl ʒ 1
Rectified spirit, fl ʒ 2.

} Dissolve with the aid of a little heat, and evaporate by the heat of a water-bath to a pilular consistence.

c. Pulvis Scammonii Compositus.

Scammony resin, in powder, 4
Jalap, in powder, 3
Ginger, in powder, 1.

} Mix, pass through a fine sieve, and rub lightly in a mortar.

2. *Resin of Scammony* is an ingredient in Extractum Colocynthidis Compositum, and Pilula Colocynthidis Composita.

Action.—Scammony resin is a **drastic purgative.** It may be used as an **anthelmintic.**

Doses—Of Resin, gr. 3 to 8; Confection, gr. 10 to 30; Compound Pill, gr. 5 to 15; Compound Powder, gr. 10 to 20.

C. Gum-Resins.

Gum-resins are characterized by forming an emulsion when mixed with water, the resin being suspended by the gum. Most of them contain a small proportion of a *volatile oil*, as well as salts.

1. Ammoniacum — Dorema Ammoniacum. *N.O. Umbelliferæ.* An exudation from the stem.

Description and Tests.—*a.* In roundish tears, varying in size from a coriander fruit to a cherry; or in nodular masses of agglutinated tears, of various sizes and forms.

b. Pale yellowish-brown externally when recent, but darkening by keeping to cinnamon-brown; milky-white and opaque internally.

c. Brittle when cold, breaking with a dull waxy fracture; softens readily with heat.

d. Faint but peculiar non-alliaceous odour; taste bitter and acrid.

e. When triturated with water forms a nearly white emulsion.

f. Coloured yellow by caustic potash; and a solution of chlorinated soda gives a bright orange hue.

PHARMACY.—1. *Officinal Preparation:—*

Mistura Ammoniaci.

Ammoniacum, in coarse powder, ʒ ¼
Distilled water, fl ʒ 8 }.

Triturate with the water, gradually added, until the mixture assumes an uniform milky appearance; strain through muslin.

2. *Ammoniacum* is contained in Emplastrum Ammoniaci cum Hydrargyro, Emplastrum Galbani, Pilula Scillæ Composita, and Pilula Ipecacuanhæ cum Scillâ.

ACTION.—Ammoniacum is a **local stimulant,** applied externally. Given internally it is a **carminative, stimulant, antispasmodic,** and **stimulant expectorant,** being chiefly used for the action last mentioned.

Doses—Of Ammoniacum, gr. 10 to 20; Mixture, fl ʒ ½ to 1.

2. ASAFŒTIDA — FERULA NARTHEX or NARTHEX ASAFŒTIDA; also FERULA SCORODOSMA, and probably other species. *N.O. Umbelliferæ.* The gum-resin obtained by incision from the living root.

DESCRIPTION AND TESTS.—*a.* Rarely in tears; usually in irregular masses varying in consistence

and size, and composed of tears agglutinated together by darker-coloured and softer material.

b. When broken or cut, the exposed surface has an amygdaloid appearance, the fractured tears being opaque and milk-white at first, but changing gradually to purplish-pink or reddish-pink, and finally to a dull yellowish brown.

c. Odour, strong, alliaceous, and persistent; taste bitter, acrid, and alliaceous.

d. When triturated with water it forms a white emulsion.

e. 50 to 60 per cent. should be soluble in rectified spirit.

f. The freshly-fractured surface of a tear when touched with nitric acid assumes for a short time a fine green colour.

g. Should yield not more than 10 per cent. of ash.

PHARMACY.—1. *Officinal Preparations :—*

a. Enema Asafœtidæ.

Asafœtida, gr. 30
Distilled water, ℥ 4. } Rub gradually into an emulsion.

b. Pilula Asafœtidæ Composita.

Asafœtida
Galbanum } of each, 2
Myrrh
Treacle, by weight, 1. } Heat by means of a water-bath, and stir until they assume a uniform consistence.

c. Tinctura Asafœtidæ.

Asafœtida, in small fragments, ℥ 2½
Rectified spirit, a sufficiency. } Macerate in fl ℥ 15 for 7 days, filter, and make up to O 1.

2. *Asafœtida* is contained in Pilula Aloes et Asafœtidæ, and Spiritus Ammoniæ Fœtidus.

ACTION.—Asafœtida has a powerful **stimulant** effect upon the alimentary canal, and thus becomes a **carminative** and **purgative.** Remotely it acts

as a **nervine stimulant, antispasmodic**, and **stimulant expectorant.** It is also regarded as an **emmenagogue.**

Doses—Of Asafœtida, gr. 5 to 20; Compound Pill, gr. 5 to 10; Tincture, fl $3\frac{1}{2}$ to 1.

3. Cambogia — Gamboge. Garcinia Hanburii. *N.O. Guttiferæ.* A gum-resin obtained by making incisions into the stem; or cutting away some of the bark, and scraping away the juice that exudes. It is collected in bamboo reeds.

Description and Tests.—*a.* In cylindrical solid or hollow rolls, longitudinally striated on the surface, and either distinct or more or less agglutinated or folded together into masses.

b. Breaking with a conchoidal fracture, the fractured surface being opaque, smooth, glistening, and of a uniform reddish-yellow colour.

c. Powder is bright-yellow.

d. No odour; taste very acrid.

e. Forms a yellow emulsion when rubbed with water. It is completely dissolved by the successive action of rectified spirit and water.

f. An emulsion made with boiling water does not become green with solution of iodine. (Absence of starch or flour).

Pharmacy.—*Officinal Preparation :—*

Pilula Cambogiæ Composita.

Gamboge, in powder, 1 Barbadoes aloes, in powder, 1 Compound powder of cinnamon, 1 Hard soap, in powder, 2 Syrup, a sufficiency.	Mix the powders, add the syrup, and beat into a uniform mass.

Action.—Gamboge is a **drastic** and **hydragogue purgative.** It is also employed as a **vermifuge.** In very small doses it is believed to be **diuretic.**

Doses—Of Gamboge, gr. 1 to 4; Compound Pill, gr. 5 to 10.

4. Galbanum—Ferula Galbaniflua and Rubricaulis; and probably other species. *N.O. Umbelliferæ.* A gum-resin probably obtained by cutting the stick a little above the root, and allowing the juice which exudes to solidify.

Description and Tests.—*a.* In tears, or in masses of agglutinated tears.

b. The tears are roundish or irregular in form, and vary in size from that of a lentil to a hazel-nut, although rarely exceeding that of a pea; yellowish-brown, orange-brown, or yellowish-green; more or less translucent; usually rough and dirty on the surface; hard and brittle in cold weather, but softening in the summer, and by the heat of the hand becoming ductile and sticky.

c. The masses, which commonly contain pieces of root, stem, and other impurities, are usually hard, compact, irregular in form, yellowish-brown, dark brownish-yellow, or rarely greenish.

d. Odour peculiar, aromatic, and not disagreeable; taste bitter, unpleasant, and somewhat alliaceous.

Pharmacy.—*Officinal Preparation:*—

Emplastrum Galbani.

Melt together { Galbanum, 1 / Ammoniacum, 1 }, and strain.

Add the mixture to { Yellow wax, 1 / Lead plaster, 8 }, previously melted together, and mix thoroughly.

2. *Galbanum* is contained in Pilula Asafœtidæ Composita.

Action.—Galbanum is chiefly used as an **external stimulant** and **local alterative.** Internally it has similar actions to ammoniacum and asafœtida, but is mainly given as a **carminative.**

5. Myrrha—Myrrh. Balsamodendron Myrrha. *N.O. Amyridaceæ.* A gum-resinous exudation obtained from the stem.

Description and Tests.—*a.* In roundish or irregular tears or masses of agglutinated tears, varying very much in size.

b. Reddish-yellow or reddish-brown externally, dry, and more or less covered by a fine powder.

c. Brittle; fractured surface is irregular, somewhat translucent, rich brown, oily, and frequently marked with opaque whitish spaces or striæ.

d. Odour agreeable, aromatic; taste aromatic, bitter, and acrid.

Pharmacy.—1. *Officinal Preparation:—*

Tinctura Myrrhæ.

Myrrh, in coarse powder, ℥ 2½
Rectified spirit, O 1.
} Made by maceration for 48 hours, and percolation.

2. *Myrrh* is contained in Decoctum Aloes Compositum, Mistura Ferri Compositum, Pilula Aloes et Myrrhæ, Pilula Asafœtidæ Composita, and Pilula Rhei Composita.

Action.—Myrrh is often employed as a mouth-wash and gargle, acting as a **local stimulant** and **antiseptic.** Internally it is a **stimulant** to the alimentary canal and **carminative;** a **uterine stimulant** and **emmenagogue;** and a **stimulant expectorant.** This drug is also said to increase the number of leucocytes in the blood.

Doses—Of Myrrh, gr. 10 to 30; Tincture, fl ℥ ½ to 1.

6. Scammonium—Scammony. Convolvulus Scammonia. *N.O. Convolvulaceæ.* A gum-resinous exudation obtained by incision from the living root, hardened in the air.

Description and Tests.—*a.* Usually in flattish cakes or pieces of irregular form and varying sizes.

b. Ash-grey or blackish-brown externally, and sometimes sprinkled over with a greyish-white powder.

c. Very brittle, and the fractured surface is resinous, shining, more or less porous, and of a uniform dark greyish-black colour.

d. Easily triturated into an ash-grey powder, which forms with water a smooth emulsion.

e. Odour peculiar, cheesy; when chewed causes a slight pricking sensation in the back of the throat.

f. Does not effervesce with hydrochloric acid. A cooled decoction is not rendered blue by solution of iodine. (Absence of chalk, starch, or flour).

g. Ether removes about 75 per cent. of resin; what remains is chiefly soluble gum, with a little moisture.

PHARMACY.—*Officinal Preparations:*—

a. Mistura Scammonii.

Scammony, in powder, gr. 6	Triturate to form a uniform emulsion.
Milk, fl ʒ 2.	

b. Resina Scammoniæ. (*See* RESINS).

ACTION.—Scammony is a **drastic purgative** and **vermifuge.**

Doses—Of Scammony, gr. 5 to 10; Mixture, fl ʒ 1 to 3.

D. BALSAMS OR BALSAMIC RESINS.

These are drugs which consist of a *resin* mixed with either *benzoic* or *cinnamic acid*, which can be obtained by sublimation with the aid of heat. They will first be separately considered as regards their materia medica and pharmacy, but it will be convenient to describe their action as a group.

1. Balsamum Peruvianum—Balsam of Peru. Myroxylon Pereiræ. *N.O. Leguminosæ.* An exudation from the trunk of the tree, after the bark has been beaten, scorched, and removed.

Description and Tests.—*a.* A thick, viscid, treacle-like liquid; of sp. gr. 1·137 to 1·150.

b. Nearly black in bulk, and opaque; in thin layers deep orange-brown or reddish-brown, and transparent.

c. Peculiar, agreeable, balsamic odour, especially when heated; slightly bitter aromatic taste; leaves a disagreeable burning sensation in the throat.

d. Soluble in chloroform or rectified spirit; insoluble in water.

e. Ten drops triturated with 6 grains of slaked lime produce a permanently soft mixture; and the mixture, warmed until all volatile matter is given off and charring commences, gives no fatty odour. Should not diminish in volume when shaken with an equal bulk of water.

2. Balsamum Tolutanum—Balsam of Tolu. Myroxylon Toluifera. *N.O. Leguminosæ.* An exudation from the trunk of the tree, after incisions have been made in bark.

Description and Tests.—*a.* A soft tenacious solid, becoming harder by keeping, and is then brittle in cold weather.

b. In thin films is transparent and of a yellowish-brown colour.

c. Highly fragrant odour, especially when warmed; taste somewhat aromatic and slightly acid.

d. Soluble in rectified spirit and ether. The solution has an acid reaction.

e. When pressed between pieces of glass with the aid of heat, it exhibits with a lens an abundance of crystals of cinnamic acid.

PHARMACY.—1. *Officinal Preparations :—*

a. Syrupus Tolutanus.—Sp. gr. 1·330.

Balsam of Tolu, ℥ 1 ¼
Refined sugar, lb 2
Distilled water, O 1, or a sufficiency.

} Boil the balsam in the water; add water to fl ℥ 16; cool; filter; and dissolve the sugar.

b. Tinctura Tolutana.

Dissolve { Balsam of Tolu, ℥ 2 ½ / Rectified spirit, fl ℥ 15 } by maceration, with occasional agitation; filter; and make up with rectified spirit to O 1.

2. *Balsam of Tolu* is an ingredient in Pilula Phosphori, and Tinctura Benzoini Composita.

Tincture of Tolu is contained in four Trochisci, namely, T. Acidi Tannici, T. Morphinæ, T. Morphinæ et Ipecacuanhæ, and T. Opii.

3. BENZOINUM—BENZOIN. STYRAX BENZOIN, and probably other species. *N.O. Styracaceæ.* A balsamic resin. It is generally procured by making deep incisions in the bark, and allowing the liquid that exudes to concrete by exposure to the air.

DESCRIPTION AND TESTS.—*a.* In masses composed of loosely agglutinated tears, or more generally the tears are closely compacted together by a deep amber-brown, reddish-brown, or greyish-brown, translucent substance. In some specimens the tears are an inch or more in length, and when first broken they have an opaque milk-white appearance, so that the masses then present an almond-like character; in others the white substance is very small in amount, and the masses when broken resemble reddish-brown granite.

b. Very brittle; softens readily by the warmth of the mouth.

c. Very little taste; agreeable balsamic odour, resembling vanilla, or, in some cases, storax.

d. Soluble in rectified spirit and solution of potash.

e. Gives off, when heated, fumes of benzoic acid.

PHARMACY.—1. *Officinal Preparations:*—

a. Acidum Benzoicum. (*See* SPECIAL ORGANIC ACIDS).

b. Tinctura Benzoini Composita (Friar's Balsam).

Benzoin, in coarse powder, ℥ 2	Macerate 7 days, with occasional agitation; filter; make up to O 1.
Prepared storax, ℥ 1½	
Balsam of tolu, ℥ ½	
Socotrine aloes, gr. 160	
Rectified spirit, O 1.	

2. *Benzoin* is contained in Adeps Benzoatus, and Unguentum Cetacei.

4. STYRAX PRÆPARATUS — PREPARED STORAX. LIQUIDAMBAR ORIENTALIS. *N.O. Liquidambaraceæ.* A balsam prepared from the inner bark. Purified by solution in spirit, filtration, and evaporation.

DESCRIPTION AND TESTS.—*a.* A semi-transparent brownish-yellow semi-fluid balsam, about the consistence of thick honey.

b. Strong balsamic odour; agreeable taste.

c. Heated in a test-tube on the vapour-bath, it becomes more liquid, but gives off no moisture; boiled with solution of bichromate of potassium and sulphuric acid, it evolves an odour resembling that of essential oil of bitter almonds.

PHARMACY.—Prepared storax is contained in Tinctura Benzoini Composita.

ACTION OF BALSAMIC RESINS.

The effects of all the members of this group being very similar, they may be conveniently considered together.

1. As *external* applications the balsams may act under different circumstances as **local stimulants, antiseptics,** or **sedatives.** They have all been used, except the Balsam of Tolu, in the treatment of wounds, ulcers, bed-sores, and skin-diseases; but are not nearly so much employed now as formerly.

The tincture of benzoin (Friar's Balsam) is a popular remedy for recent wounds. Benzoin is present as an antiseptic in Adeps Benzoatus and Unguentum Cetacei.

2. *Internally* administered, all the balsams are more or less **carminative,** but are seldom used for this purpose; they are chiefly employed as **stimulant expectorants**, the flavour of some of their preparations being also agreeable. Tincture of benzoin is not uncommonly used as an inhalation or spray, to relieve irritable cough. Balsams have some degree of action as **diuretics,** and probably have a **specific** effect upon the urinary mucous membrane, but they are not practically given for these purposes. Prepared storax is only employed as an ingredient in Compound Tincture of Benzoin.

Doses—Of Balsam of Peru, ♏ 10 to 15; Balsam of Tolu, gr. 10 to 20; Syrup, fl ʒ 1; Tincture, ♏ 20 to 40; Tincture of Benzoin, fl ʒ ½ to 1.

E. Turpentines or Oleo-Resins.

These are drugs which consist of a *volatile oil* and a *resin*; the oil can be separated by heating the oleo-resin, the resin being left behind.

1. Copaiba—Copaiva or Copaiba. Copaifera Langsdorffi, and other species. *N. O. Leguminosæ.* The oleo-resin obtained by cutting deeply or boring into the trunk.

DESCRIPTION AND TESTS.—*a.* A more or less viscid fluid; of sp. gr. 0·940 to about 0·993.

b. Light yellow to pale golden brown; generally transparent and not fluorescent, but some varieties are opalescent and occasionally slightly fluorescent.

c. Peculiar aromatic odour; persistent acrid somewhat bitter taste.

d. A small quantity heated until all volatile oil is removed yields a residue which, when cold, is hard, and generally easily rubbed to powder; and the volatilized oil does not smell of turpentine.

e. Almost entirely soluble in absolute alcohol, and in four times its bulk of petroleum spirit, the latter solution only yielding a filmy deposit on standing.

PHARMACY.—*Officinal Preparation:*—

Oleum Copaibæ. (*See* OILS.)

ACTION.—Copaiba is a valuable **diuretic,** and has also a **specific** action upon the genito-urinary mucous membrane, especially that lining the urethra. It is also a **stimulant expectorant.** It sometimes produces a rash on the skin, somewhat resembling that of measles.

Dose—fl ʒ ½ to 1.

2. OLEO-RESINA CUBEBÆ—OLEO-RESIN OF CUBEBS.

PREPARATION.—This oleo-resin is specially prepared by percolating Cubebs, in coarse powder, with ether; evaporating or distilling off the ether; and transferring the residue to a closed vessel, letting it stand until waxy or crystalline matter ceases to be deposited. Decant the oleo-resin, and preserve it in a well-stoppered bottle.

ACTION.—The oleo-resin of cubebs is mainly used as a **diuretic,** and for its **specific** effects upon the genito-urinary mucous membrane; it probably acts also as a **stimulant expectorant.**

Dose—♏ 5 to 30.

3. Terebinthina Canadensis — Canada Turpentine or Balsam. Pinus Balsamea. *N.O. Coniferæ.* The turpentine obtained by puncturing or incising the bark of the trunk and branches.

Description and Tests.—*a.* A pale-yellow and faintly greenish transparent oleo-resin, of the consistence of thin honey.

b. Peculiar agreeable terebinthinate odour; slightly bitter feebly acrid taste.

c. By exposure to the air it dries very slowly into a transparent adherent varnish, and solidifies when mixed with about a sixth of its weight of magnesia.

Pharmacy.—Canada balsam is contained in Charta Epispastica and Collodium Flexile.

Action.—Canada balsam is chiefly used for pharmaceutical purposes. Locally it is somewhat **stimulant.** Internally it is said to act like oil of turpentine, but is rarely given.

Dose—gr. 20 to 30.

4. Thus Americanum — Common Frankincense. Pinus australis and Tæda. *N.O. Coniferæ.* The concrete turpentine which is scraped off the trunks.

Description.—When fresh it is a softish yellow opaque tough solid, with the same odour as crude American turpentine, but by keeping it becomes dry and brittle, darker in colour, and of a milder odour.

Pharmacy.—Frankincense is contained in Emplastrum Picis.

Action.—Frankincense is used chiefly for pharmaceutical purposes, but is also an **external stimulant.**

Group XIII.—OILS AND THEIR PRODUCTS.

The officinal drugs included under this group may be considered under the following subdivisions :—

1. **Simple fixed oils.**
2. **Aromatic volatile oils.**
3. **Concrete oils.**
4. **Stearoptenes.**
5. **Special oils, fixed and volatile.**
6. **Glycerine.**
7. **Soaps.**

1. Simple Fixed Oils.

Source and Preparation.—The simple fixed oils are all obtained by *pressure* from certain parts of plants, and they include :—

1. **Oleum Amygdalæ—Almond oil.** From the *seeds* of *Amygdala amara* and *dulcis*. *N.O.* **Rosaceæ.**

2. **Oleum Lini—Linseed oil.** Expressed in Britain without heat. From the *seeds* of *Linum usitatissimum*. *N.O.* **Linaceæ.**

3. **Oleum Olivæ—Olive oil.** From the *ripe fruit* of *Olea Europæa*. *N.O.* **Oleaceæ.**

Characters and Properties.—*a*. The members of this group are liquids of an oily consistence, linseed oil being rather viscid.

b. Their colour is more or less yellow, linseed oil being the darkest; olive oil is pale yellow or greenish yellow.

c. Their odour is faint, but peculiar; almond oil is almost inodorous. Taste bland and oleaginous.

d. They are insoluble in water; soluble in ether; only slightly soluble in alcohol. They mix with each other in all proportions.

e. They are liable to decompose by prolonged exposure to air, becoming rancid; olive oil is the most stable. Linseed oil gradually thickens by exposure to the air. Olive oil congeals partially at about 36°.

PHARMACY.—1. *Almond oil* is the solvent in Oleum Phosphoratum; and is an ingredient in Unguentum Cetacei, Unguentum Resinæ, and Unguentum Simplex and the preparations containing it.

2. *Olive oil* is contained in Charta Epispastica, Enema Magnesii Sulphatis, Linimentum Ammoniæ, Linimentum Calcis, Linimentum Camphoræ, and several Emplastra and Unguenta.

ACTION.—Externally the simple fixed oils are **emollient** and **protective.** Internally almond and olive oils may be used as **nutrients,** and are also administered as **antidotes** in poisoning by corrosive agents and alkalies; olive oil is **laxative,** especially in the form of enema.

2. AROMATIC VOLATILE OILS.

SOURCE AND PREPARATION.—The volatile oils belonging to this class are obtained, with one exception, by *distilling* certain parts of plants with water, and collecting the oil which passes over; one—*Oleum Limonis*—is obtained by mechanical means. Those recognised in the B.P. may be thus arranged, and they are in most cases directed to be distilled in Britain :—

1. Volatile oils from Umbelliferous fruits.

a. Oleum Anethi—Oil of Dill. From *Anethum graveolens.*

b. Oleum Anisi—Oil of Anise. From *Pimpinella Anisum*, in Europe. (Also from the fruit of *Illicium anisatum* or *Star Anise*, in China. *N.O.* **Magnoliaceæ.**)

c. Oleum Carui—Oil of Caraway. From *Carum Carui.*

d. Oleum Coriandri—Oil of Coriander. From *Coriandrum sativum.*

2. **Volatile oils from N.O. Labiatæ.**

a. Oleum Lavandulæ—Oil of Lavender. From the flowers of *Lavandula vera.*

b. Oleum Menthæ Piperitæ—Oil of Peppermint. From fresh flowering peppermint—*Mentha Piperita.*

c. Oleum Menthæ Viridis—Oil of Spearmint. From the fresh flowering spearmint—*Mentha viridis.*

d. Oleum Rosmarini—Oil of Rosemary. From the flowering tops of *Rosmarinus officinalis.*

3. **Volatile oils from N.O. Myrtaceæ.**

a. Oleum Cajuputi—Oil of Cajeput. From the leaves of *Melaleuca minor.*

b. Oleum Caryophylli—Oil of Cloves. From cloves, the unexpanded dried flower-buds of *Caryophyllus aromaticus.*

c. Oleum Pimentæ—Oil of Pimento. From pimento, the dried unripe fruit of *Pimenta officinalis.*

4. **Volatile oils from various sources.**

a. Oleum Anthemidis—Oil of Chamomile. From chamomile, the flowers of *Anthemis nobilis. N.O.* **Compositæ.**

b. Oleum Cinnamomi—Oil of Cinnamon. From the inner bark of *Cinnamomum Zeylanicum. N.O.* **Lauraceæ.**

c. Oleum Limonis—Oil of Lemon. Obtained by mechanical means from fresh lemon peel—*Citrus Limonis. N.O.* **Aurantiaceæ.**

d. Oleum Myristicæ—Oil of Nutmeg. From nutmeg—*Myristica Fragrans. N.O.* **Myristicaceæ.**

CHARACTERS AND PROPERTIES.—1. All the oils in this division are either colourless, or more or less yellow or brownish, except *Oleum Cajuputi*, which is of a pale bluish-green colour.

2. Each oil has a powerful and peculiar odour and taste, the latter being also warm and aromatic, and usually more or less bitter.

3. They are slightly soluble in water; completely in alcohol and fixed oils.

PHARMACY.—1. *Officinal Preparations.*—There are three classes of pharmaceutical preparations in which volatile oils are specially contained, and these must be separately considered.

A. AQUÆ.—As already mentioned, there is a class of *aquæ* or *waters* which contain volatile oils, being prepared either by distilling some part of the plant, or a volatile oil itself, with water. It will be useful to give here a complete list of these preparations, but only the mode of preparation of those will be mentioned which are not alluded to elsewhere. In several instances the volatile oils are not recognised officinally as separate drugs.

a. **Aquæ prepared from Umbelliferous fruits.**

(i) *Aqua Anethi*—Dill water.
(ii) „ *Anisi*—Anise water.
(iii) „ *Carui*—Caraway water.
(iv) „ *Fœniculi*—Fennel water.

b. **Aquæ prepared from Volatile oils.**

(i) *Aqua Menthæ Piperitæ*—Peppermint Water.
(ii) *Aqua Menthæ Viridis*—Spearmint Water.

Volatile oil, 3 $1\frac{1}{2}$
Water, C $1\frac{1}{2}$.
} Distil C 1.

c. **Aquæ prepared from Flowers.**

(i) *Aqua Floris Aurantii*—Orange flower water. Distilled from flowers of the bitter and sweet orange.
(ii) *Aqua Rosæ*—Rose water.
(iii) „ *Sambuci*—Elder-flower water.

d. **Aquæ prepared from various parts of plants.**

(i) *Aqua Cinnamomi*—Cinnamon water. From the bark.
(ii) *Aqua Laurocerasi* — Cherry-Laurel water. From the leaves.
(iii) *Aqua Pimentæ* — Pimento water. From Pimento.

B. SPIRITUS.—These consist of solutions of the several volatile oils in rectified spirit :—

a. *Spiritus Cajuputi*
b. „ *Cinnamomi*
c. „ *Lavandulæ*
d. „ *Menthæ Piperitæ*
e. „ *Myristicæ*
f. „ *Rosmarini*

} Volatile oil, 1
Rectified spirit, 49.

C. ESSENTIÆ.—These are *strong* solutions of volatile oils in rectified spirit :—

a. *Essentia Anisi*
b. „ *Menthæ Piperitæ*

} Volatile oil, 1
Rectified spirit, 4.

2. *Other preparations containing volatile oils.*

a. Tinctura Lavandulæ Composita.

Oil of Lavender, ♏ 90 Oil of Rosemary, ♏ 10 Cinnamon, bruised, gr. 150 Nutmeg, bruised, gr. 150 Red Sandal-wood, gr. 300 Rectified spirit, O 2.	Macerate the solid drugs in the spirit for 7 days; strain and press; dissolve the oils in the tincture; filter; and make up to O 2 with spirit.

b. Several volatile oils are contained in *special preparations*, as follows :—

Oleum Anisi in Tinctura Camphoræ Composita and Tinctura Opii Ammoniata.
Oleum Anthemidis in Extractum Anthemidis.
Oleum Cajuputi in Linimentum Crotonis.
Oleum Carui in Confectio Scammonii and Pilula Aloes Barbadensis.
Oleum Caryophylli in Confectio Scammonii, Pilula Colocynthidis Composita, and Pilula Colocynthidis et Hyoscyami.
Oleum Coriandri in Syrupus Sennæ.
Oleum Lavandulæ in Linimentum Camphoræ Compositum.
Oleum Limonis in Linimentum Potassii Iodidi cum Sapone, and Spiritus Ammoniæ Aromaticus.
Oleum Menthæ Piperitæ in Pilula Rhei Composita, and Tinctura Chloroformi et Morphinæ.
Oleum Myristicæ in Pilula Aloes Socotrinæ, and Spiritus Ammoniæ Aromaticus.
Oleum Rosmarini in Linimentum Saponis.

c. Some of the *aquæ* are contained in special preparations, namely :—

Aqua Menthæ Piperitæ in Mistura Ferri Aromatica.
Aqua Rosæ in Mistura Ferri Composita, and Trochisci Bismuthi.

Aqua Cinnamomi in Mistura Cretæ, Mistura Guaiaci, and Mistura Spiritus Vini Gallici.
Aqua Aurantii Floris in :—

(i) Syrupus Aurantii Floris.

Orange-flower water, fl ℥ 8 Refined sugar, ℔ 3 Distilled water, fl ℥ 16, or a sufficiency.	Dissolve the sugar in the water by heat ; strain, and when nearly cold, add the orange-flower water and distilled water to make the product = ℔ 4½.

Action.—All the volatile oils in this group have similar actions. Externally they are **antiseptic, disinfectant, stimulant,** and **rubefacient,** or are employed on account of their odour. Internally they act as **gastric stimulants, carminatives,** and **antispasmodics.** Many of them are chiefly used as flavouring agents.

Doses—Of Volatile Oils, ♏ 1 to 4 ; Aquæ, *ad lib.* ; Spiritus, fl 3 ½ to 1 ; Essentiæ, ♏ 10 to 20 ; Tincture of Lavender, fl 3 ½ to 2 ; Syrup of Orange Flower, fl 3 1.

3. Concrete Oils.

1. **Oleum Myristicæ Expressum—Expressed Oil of Nutmeg.**—A *concrete oil* obtained by means of expression and heat from nutmeg.

Characters.—This is a substance of firm consistence ; orange-brown or orange-yellow colour, more or less mottled ; and fragrant odour, like that of nutmeg. It consists of fixed fat, yielding myristic acid ; and some volatile oil.

Pharmacy.—Expressed oil of nutmeg is contained in Emplastrum Calefaciens and contained in Emplastrum Picis.

ACTION.—Expressed oil of nutmeg is an **external stimulant,** but is chiefly used for pharmaceutical purposes.

2. **Oleum Theobromatis—Oil of Theobroma —Cacao butter.** A *concrete oil* obtained by expression and heat from the ground seeds of *Theobroma Cacao.* *N.O.* **Byttneriaceæ.**

CHARACTERS.—*a.* Oil of theobroma is of the consistency of tallow; of a yellowish colour; with a clean fracture, presenting no appearance of foreign matter.

b. Odour resembles that of chocolate; taste bland and agreeable.

c. It usually melts at temperatures between 86° and 95°.

d. It does not become rancid from exposure to the air.

PHARMACY. — Oil of theobroma is used in the preparation of several of the *Suppositories.*

ACTION.—Oil of theobroma is an **emollient,** but seldom used for that purpose. Internally it is said to be **nutrient;** and has been recommended as a substitute for cod-liver oil.

4. STEAROPTENES.

1. **Camphora—Camphor.** A stearoptene obtained from the wood of *Cinnamomum Camphora.* *N.O.* **Lauraceæ.** Imported in the crude state, and purified by sublimation.

CHARACTERS.—*a.* Camphor occurs in solid colourless translucent crystalline masses, which present numerous fissures when of any size.

b. It is somewhat tough, but readily powdered if moistened with rectified spirit, ether, or chloroform.

c. It has a powerful, characteristic, penetrating odour; and a pungent, somewhat bitter taste, followed by a sensation of cold.

d. It floats on water; burns readily with a bright smoky flame; volatilizes somewhat rapidly even at ordinary temperatures; and sublimes entirely when heated.

e. It is very slightly soluble in water, but readily soluble in rectified spirit, ether, or chloroform. (When camphor is rubbed with carbolic acid crystals (3 to 1), or with hydrate of chloral (equal parts), liquids are formed, which are used therapeutically.)

PHARMACY.—1. *Officinal Preparations:—*

a. Aqua Camphoræ—Camphor water.

Camphor, ℥ ½
Distilled water, C 1.
Macerate for at least 2 days in a closed bottle, enclosing the crushed camphor in a muslin bag.

b. Linimentum Camphoræ—Liniment of Camphor.

Camphor, 1
Olive oil, 4.
Dissolve.

c. Linimentum Camphoræ Compositum.

Camphor, ℥ 2½
Oil of lavender, fl ʒ 1
Strong solution of ammonia, fl ℥ 5
Rectified spirit, fl ℥15.
Dissolve the camphor and oil in the spirit, add the solution of ammonia gradually, shaking them together until a clear solution is formed.

d. Spiritus Camphoræ—Spirit of Camphor.

Camphor, 1
Rectified spirit, 9.
Dissolve.

e. Tinctura Camphoræ Composita—Paregoric Elixir.

Opium, in powder, gr. 40
Benzoic acid, gr. 40
Camphor, gr. 30
Oil of anise, fl ʒ ½
Proof spirit, O 1.
Macerate 7 days, with occasional agitation, filter, and make up to O 1.

2. *Camphor* is an ingredient in several Liniments; and in Unguentum Hydrargyri Compositum. *Camphor water* is the solvent in Injectio Apomorphinæ Hypodermica, Injectio Ergotini Hypodermica, and Liquor Atropinæ Sulphatis.

Action.—Camphor is an important drug, and is much used for various purposes. Externally it acts as an **antiseptic, stimulant,** and **rubefacient.** Internally it is employed as a **carminative, general stimulant, antispasmodic, expectorant, diaphoretic,** and **anaphrodisiac.** In full doses it is liable to cause cerebral excitement, and a form of intoxication; while in poisonous doses it produces symptoms of general depression, with convulsions and coma.

Doses—Of Camphor, gr. 1 to 10; Camphor Water, fl ʒ 1 to 2; Spirit, ♏ 10 to 30; Compound Tincture, ♏ 15 to fl ʒ 1.

2. **Menthol.** — $C_{10}H_{20}O$. — A stearoptene obtained by cooling the oil distilled from the fresh herb of *Mentha Arvensis*, and of *Mentha Piperita*. *N. O.* **Labiatæ.**

Characters and Tests.—*a.* Menthol is in colourless acicular crystals, usually more or less moist from adhering oil; or in fused crystalline masses.

b. Its melting-point should not exceed 110°. The hardest masses do not melt below 108°.

c. It has the odour and flavour of peppermint, producing warmth on the tongue, or, if air is inhaled, a sensation of coolness.

d. It is sparingly soluble in water, and nearly soluble in rectified spirit, the solution having a neutral reaction.

e. Boiled with sulphuric acid diluted with half its volume of water, menthol acquires an indigo-blue or ultramarine colour, the acid becoming brown. It

should be entirely dissipated by the heat of a water-bath.

ACTION.—Menthol is chiefly used as a **local anodyne.** It is also regarded as an **antiseptic.** Internally it may be given as a **carminative.**

Dose—gr. ½ to 2.

3. **Thymol.** — $C_{10}H_{13}HO$. — A stearoptene obtained from the volatile oils of *Thymus vulgaris*, *Monarda punctata*, and *Carum Agowan*, by saponifying with caustic soda, and treating the separated soap with hydrochloric acid, or from a distilled fraction of the oil by exposure at a low temperature. It may be purified by recrystallization from alcohol.

CHARACTERS AND TESTS.—*a.* Thymol is in large oblique prismatic crystals.

b. They have the odour of thyme, and a pungent aromatic flavour.

c. They sink in cold water, but on heating the mixture to a temperature of 110° to 125°, they melt and rise to the surface.

d. Slightly soluble in cold water; freely soluble in alcohol, ether, and solutions of alkalies.

e. The crystals volatilize completely at the temperature of a water-bath.

f. A solution of thymol in half its bulk of glacial acetic acid, warmed with an equal volume of sulphuric acid, assumes a reddish-violet colour.

ACTION.—Thymol is a **deodorant, disinfectant,** and **antiseptic.** It is not only used locally, but also as an inhalation in connection with the respiratory system. Internally thymol is eliminated by the respiratory and urinary organs, and has been used for its **antiseptic** effect upon these organs.

Dose—gr. ½ to 2.

5. Special Oils.

Several important drugs belong to this group, and they must be considered separately, as each oil has its own special action and therapeutic uses. It will be well to enumerate them at the outset, in the order in which they will be discussed :—

Special Fixed oils.
- *Oleum Ricini*—*Castor oil.*
- „ *Crotonis*—*Croton oil.*

Special Volatile oils.
- *Oleum Copaibæ*—*Oil of Copaiva.*
- „ *Cubebæ*—*Oil of Cubebs.*
- „ *Eucalypti*—*Oil of Eucalyptus.*
- „ *Juniperi*—*Oil of Juniper.*
- „ *Pini sylvestris*—*Fir-Wood oil.*
- „ *Rutæ*—*Oil of Rue.*
- „ *Sabinæ*—*Oil of Savin.*
- „ *Santali*—*Oil of Sandal Wood.*
- „ *Sinapis*—*Oil of Mustard.*
- „ *Terebinthinæ*—*Oil of Turpentine.*

A. Special Fixed Oils.

1. **Oleum Ricini—Castor Oil.** — The oil expressed from the *seeds* of *Ricinus communis*, either without (*cold-drawn*) or with the aid of heat. *N.O.* **Euphorbiaceæ.** The seeds yield about 25 to 30 per cent. of oil. It is composed mainly of *ricinic*, *ricinoleic*, and *ricin-stearic* acids, combined with glycerine; with some acrid resinous matter.

Characters.—*a.* Castor oil is viscid; and colourless or pale straw-yellow.

b. It has scarcely any odour; and a mild taste at first, but subsequently acrid and unpleasant.

c. Entirely soluble in rectified spirit (1 in 2); in absolute alcohol (1 in 1).

PHARMACY.—*Castor oil* is contained in Collodium Flexile, Linimentum Sinapis Compositum, and Pilula Hydrargyri Subchloridi Composita.

ACTION.—Externally castor oil may be used as an **emollient** and **protective.** Internally it is an **aperient.** *Dose*—fl ʒ i to 8.

2. **Oleum Crotonis—Croton Oil.**—The oil expressed in Britain from the *seeds* of *Croton Tiglium. N.O.* **Euphorbiaceæ.** The kernels of the seeds yield about 50 to 60 per cent. of oil. It consists of an active fixed oil : and a volatile oily liquid—*crotonic acid.*

CHARACTERS.—*a.* Croton oil is brownish-yellow to dark reddish-brown, fluorescent, with a viscid consistence which is increased by age.

b. Faint, peculiar, somewhat rancid, disagreeable odour; taste oily and acrid.

c. Entirely soluble in alcohol.

PHARMACY.—*Officinal Preparation :—*

Linimentum Crotonis. { Croton oil, 1 / Oil of Cajeput, 3½ / Rectified spirit, 3½. } Mix.

ACTION.—Externally croton oil is a **pustulant.** Internally it acts as a powerful **drastic purgative.**

Dose—♏ ½ to 1.

B. The *special volatile oils* are all obtained by *distillation*, and the principal facts relating to the several oils may be readily summarized. Each has a peculiar and characteristic odour and taste.

1. **Oleum Copaibæ—Oil of Copaiva.** *N.O.* **Leguminosæ.** From *Copaiva*, which yields about 40 per cent. of oil. Colourless or pale-yellow.

ACTION.—The effects of the oil of copaiva are similar to those of copaiva itself. (*See* COPAIBA.)

Dose—m 5 to 20.

2. **Oleum Cubebæ—Oil of Cubebs.** Distilled in Britain from *Cubebs*. *N.O.* **Piperaceæ.** Colourless or greenish-yellow.

ACTION.—The oil of cubebs acts like cubebs. (*See* CUBEBS.) *Dose*—m 5 to 20.

3. **Oleum Eucalypti—Oil of Eucalyptus.** From the fresh leaves of *Eucalyptus Globulus*, *Eucalyptus Amygdalinæ*, and probably other species. *N.O.* **Myrtaceæ.** Colourless, or pale straw-coloured, becoming darker and thicker by exposure. It has an aromatic odour, and a spicy and pungent flavour, leaving a sensation of coldness in the mouth. It is neutral to test-paper. Sp. gr. about 0·900. Soluble in about an equal weight of alcohol.

PHARMACY.—*Officinal Preparation:—*

Unguentum Eucalypti.

Oil of Eucalyptus, by weight, 1 Soft Paraffin, 2 Hard Paraffin, 2.	Melt the paraffins, add the oil, and stir until cold.

ACTION.—Externally oil of eucalyptus is a valuable **antiseptic** and **disinfectant**; and it is also used as an inhalation. Internally it is employed as an **antiseptic**, and is, moreover, believed to be an **antipyretic** and **antiperiodic**. *Dose*—m 1 to 4.

4. **Oleum Juniperi—Oil of Juniper.** Distilled in Britain from the full-grown unripe green fruit of *Juniperus communis*. *N.O.* **Coniferæ.** Colourless or pale greenish-yellow.

PHARMACY.—*Officinal Preparation :—*

Spiritus Juniperi. { Oil of juniper, 1 / Rectified spirit, 49. } Mix.

ACTION.—Oil of juniper is a **carminative** and **stimulant,** but is chiefly used as a **diuretic.**

Doses—Of Oil, ♏ 1 to 4 ; Spirit, ♏ 30 to 60.

5. **Oleum Pini Sylvestris — Fir-Wood Oil.** From the fresh leaves of *Pinus sylvestris. N.O.* **Coniferæ.** Colourless or nearly so, with an aromatic lavender-like odour, and a pungent but not unpleasant flavour. Sp. gr. not below 0·870. Soluble in about seven times its volume of rectified spirit.

PHARMACY.—*Officinal Preparation :—*

Vapor Olei Pini Sylvestris.

Fir-Wood Oil, ♏ 40
Light Carbonate of Magnesium, gr. 20
Water, a sufficiency.

Rub the oil with the carbonate, and gradually add sufficient water to produce fl ℥ 1. One fluid drachm to be used with O½ each of cold water and boiling water.

ACTION.—Fir-wood oil is only used as an inhalation, acting as a **stimulant** and **antiseptic.**

6. **Oleum Rutæ—Oil of Rue.** From the fresh herb of *Ruta graveolens. N.O.* **Rutaceæ.** Pale yellow when recent.

ACTION.—Externally oil of rue is a **stimulant** and **rubefacient.** Internally it is **carminative, antispasmodic, emmenagogue,** and **oxytocic.**

Dose—♏ 1 to 4.

7. **Oleum Sabinæ—Oil of Savin.** Distilled in Britain from the fresh tops of *Juniperus Sabina. N.O.* **Coniferæ.** Colourless or pale yellow.

ACTION.—Oil of savin is used as an **emmenagogue** and **oxytocic**. *Dose*—♏ 1 to 4.

8. **Oleum Santali—Oil of Sandal Wood.** From the wood of *Santalum album*. *N.O.* **Santalaceæ.** Thick in consistence, pale yellow; strongly aromatic odour, pungent and spicy flavour; neutral or slightly acid in reaction. Sp. gr. usually about 0·96. Readily soluble in alcohol.

ACTION.—Oil of sandal wood is administered internally for its **specific** effect upon the urinary mucous membrane. *Dose*—♏ 10 to 30.

9. **Oleum Sinapis—Oil of Mustard.** Distilled with water from *Black Mustard seeds—Sinapis nigra*, after expression of the fixed oil. *N.O.* **Cruciferæ.** A product of the action of *myrosine* on *myronate of potash;* and consists chemically of *sulphocyanide of allyl.* Colourless or pale yellow. Sp. gr. 1·015 to 1·020. Has an intensely penetrating odour, and a very acrid burning taste. Dissolves readily in alcohol and ether, and to a slight extent in water.

PHARMACY.—*Officinal Preparation:—*

Linimentum Sinapis Compositum.

Oil of Mustard, fl ʒ 1 Ethereal Extract of Mezereon, gr. 40 Camphor, gr. 120 Castor oil, fl ʒ 5 Rectified spirit, fl ʒ 4.	Dissolve the extract and camphor in the spirit, and add the oils.

ACTION.—Oil of mustard is only used externally. When strong it is a powerful **vesicant**; more or less diluted it will act as a **rubefacient** or **stimulant.**

10. **Oleum Terebinthinæ — Oil of Turpentine.** Distilled, usually by aid of steam, from the *Turpentine* or *Oleo-resin* obtained from *Pinus Australis*, *Tæda*, and sometimes *Pinaster* and *Sylvestris.*

N.O. **Coniferæ.** Limpid, colourless; with a strong peculiar odour, which varies in the different kinds; and a pungent bitterish taste. It commences to boil at about 320°, and almost entirely distils below 356°, little or no residue remaining.

PHARMACY.—*Officinal Preparations:*—

a. Confectio Terebinthinæ.

Oil of Turpentine, fl ℥ 1
Liquorice root, in powder, ℥ 1
Clarified Honey, ℥ 2.

Rub the oil with the liquorice, add the honey, and mix.

b. Enema Terebinthinæ.

Oil of Turpentine, fl ℥ 1
Mucilage of Starch, fl ℥ 15.

Mix.

c. Linimentum Terebinthinæ.

Soft soap, ℥ 2
Distilled water, fl ℥ 2
Camphor, ℥ 1
Oil of Turpentine, fl ℥ 16.

Mix the soap with the water; dissolve the camphor in the turpentine; and rub together until thoroughly mixed.

d. Linimentum Terebinthinæ Aceticum.

Oil of Turpentine, 4
Glacial acetic acid, 1
Liniment of Camphor, 4.

Mix.

e. Unguentum Terebinthinæ.

Oil of Turpentine, fl ℥ 1
Resin, in coarse powder, gr. 54
Yellow wax, ℥ ½
Prepared lard, ℥ ½.

Melt by the heat of a steam or water-bath, and stir the mixture constantly while it cools.

ACTION. — Externally oil of turpentine may be employed as an **antiseptic, vesicant, rubefacient,** or **stimulant.** Internally it has numerous actions, and is employed for various purposes, namely, as a **carminative, stimulant, diuretic, anthelmin-**

tic, antispasmodic, hæmostatic, and **expectorant.** It has also been administered as an **antidote** in poisoning by phosphorus. In large doses turpentine causes symptoms of depression, with a tendency to stupor or coma. It is useful in the form of inhalation, as an **antiseptic** and **expectorant.**

Doses—Of Oil, ♏ 10, fl ʒ 4; Confection, gr. 60 to 120.

6. Glycerinum—Glycerine.

Glycerine is a sweet principle, $C_3H_5(HO)_3$, obtained by reaction of fats and fixed oils with aqueous fluids, and containing a small percentage of water.

Characters and Tests.—*a.* Glycerine is a clear colourless fluid, oily to the touch; sp. gr. about 1·250.

b. It is without odour; of a sweet taste.

c. It is freely soluble in water and alcohol.

d. When decomposed by heat, it evolves intensely irritating vapours.

e. Its solution is not affected by nitrate of silver, sulphydrate of ammonium, oxalate of ammonium, or chloride of barium; and does not alter the colour of moistened blue or red litmus paper. Shaken with an equal volume of sulphuric acid, no coloration, or only a very slight straw coloration, should result. When gently heated with diluted sulphuric acid, no rancid odour is produced.

Pharmacy.—Glycerine is very serviceable for dissolving, suspending, and incorporating various drugs, as well as for its taste, and hence is much used in pharmacy.

1. The officinal group of *Glycerina* or *Glycerines* include:—

a. Glycerinum Acidi Carbolici
b. „ Acidi Gallici
c. „ Acidi Tannici
} = 1 in 4.

d. Glycerinum Aluminis = 1 in 5.
e. ,, Amyli = 1 in 8.
f. ,, Boracis = 1 in 6.
g. ,, Plumbi Subacetatis } = 3 in 14.
h. ,, Tragacanthæ }

2. *Glycerine* is also an ingredient in Extractum Cinchonæ Liquidum, all the Lamellæ, Linimentum Iodi, Linimentum Potassii Iodidi cum Sapone, Mel Boracis, Pilula Aloes et Myrrhæ, Pilula Rhei Composita, Pilula Saponis Composita, Tinctura Kino, and Unguentum Iodi.

3. *Glycerine of Starch* is an ingredient in some of the Suppositories.

Dose—fl 3 1 to 2.

Action.—Externally and locally applied, glycerine is an **emollient,** and is also supposed to be somewhat **antiseptic** and **stimulant.** It is very useful as a solvent of other drugs, and for aiding the absorption through the skin of some important agents. Internally glycerine is much employed as a **flavouring** agent; it may be given as a **laxative,** and is also regarded as a **nutrient.**

7. Sapones—Soaps.

There are three officinal soaps, namely:—

1. **Sapo Animalis—Curd Soap.** Made with soda and a purified animal fat consisting principally of stearin.

2. **Sapo Durus—Hard Soap.** Made with soda and olive oil.

3. **Sapo Mollis—Soft Soap.** Made with potash and olive oil.

Characters and Tests.—*Curd soap* is white or with a very light greyish tint; dry, horny, and pulverizable when kept in dry warm air. Easily moulded

when heated. Soluble in rectified spirit. Soluble also in hot water, the solution being neutral or only very faintly alkaline to test-paper. It does not impart a greasy stain to paper. Incinerated it yields an ash which does not deliquesce. *Hard soap* has similar characters, but is greyish-white. *Soft soap* is yellowish-green; and of a gelatinous consistence. Soluble in rectified spirit; not imparting an oily stain to paper. Incinerated it yields an ash which is very deliquescent. All the soaps should be inodorous.

PHARMACY.—1. *Officinal Preparations.* The named preparations containing soap in the B.P. include:—

a. Emplastrum Saponis.

Curd soap, 6 Lead plaster, 36 Resin, 1.	Melt the lead plaster at a low temperature; add the soap and resin, liquefied; evaporate, constantly stirring.

b. Emplastrum Saponis Fuscum.

Curd soap, in powder, ℥ 10 Yellow wax, ℥ 12½ Oxide of lead, ℥ 15 Olive oil, O 1 Vinegar, C 1.	Boil the vinegar and oxide together by the heat of a steam bath, constantly stirring; add the soap, and evaporate by boiling; add the wax and oil, melted together; evaporate, stirring continuously, to the consistence of plaster.

c. Linimentum Saponis.

Hard soap, in fine shavings, ℥ 2 Camphor, ℥ 1 Oil of rosemary, fl 3 3 Rectified spirit, fl ℥ 16 Distilled water, fl ℥ 4.	Add the other ingredients to the mixed water and spirit; macerate for 7 days under 70°, with occasional agitation; and filter.

d. Pilula Saponis Composita. Contains *Opium*, 1 in 6 nearly. (*See* OPIUM.)

2. The *other preparations* in which the different forms of soap are contained are as follows:—

a. Curd Soap in Emplastrum Resinæ, Extractum Colocynthidis Compositum, Linimentum Potassii cum Sapone, Pilula Phosphori, Pilula Scammonii Composita, and the Suppositories made with soap.

b. Hard Soap in Emplastrum Saponis, and Emplastrum Calefaciens.

c. Soft Soap in Linimentum Terebinthinæ.

d. Linimentum Saponis in Linimentum Opii.

ACTION.—Soaps are chiefly employed for pharmaceutical purposes, but are also valuable **detergents** and **emollients.** Soap is often administered in **aperient** enemata.

GROUP XIV.—CONCRETE JUICES AND EXTRACTS.

This group includes certain drugs which are of a more or less complex composition, and cannot be referred to any of the groups already considered. Each drug must be discussed separately, and they may be taken in alphabetical order.

1. **Aloe—Aloes.** This is the juice, when inspissated, which flows from the transversely cut bases of the leaves of certain species of Aloe. *N.O.* **Liliaceæ.** There are two *officinal* varieties, namely:—

a. Aloe Barbadensis—Barbadoes Aloes, obtained from the *Aloe vulgaris.* Imported from Barbadoes and the Dutch West Indian islands, and known in commerce as Barbadoes and Curaçoa Aloes.

b. Aloe Socotrina—Socotrine Aloes, obtained from Aloe Perryi, and probably other species. Imported principally by way of Bombay and Zanzibar, and known in commerce as Socotrine and Zanzibar Aloes.

CHARACTERS.—Aloes occurs in masses of various sizes, and the characters of the two officinal varieties may be thus contrasted :—

BARBADOES.	SOCOTRINE.
a. Colour varying from deep reddish-brown or chocolate-brown to dark brown or almost black. Opaque in mass, but in thin films translucent and of an orange-brown tint.	*a.* Colour of various shades of reddish-brown, darkening by exposure to the air. In thin films transparent and orange-ruby-red or orange-brown.
b. Fracture usually dull and waxy, or sometimes smooth and glassy.	*b.* Fracture usually smooth and resinous, or rarely rough and irregular.
c. Powder dull olive-yellow.	*c.* Powder bright tawny reddish-brown.
d. Odour strong and disagreeable; taste bitter and nauseous. (The Curaçoa variety is commonly more glassy and translucent, and has a distinctive odour.)	*d.* Odour strong and somewhat agreeable; taste very bitter. (In other cases Socotrine aloes is more or less opaque and liver-coloured, and is then known as *hepatic aloes*.)

e. Both varieties of aloes when moistened with rectified spirit and examined in a thin stratum under the microscope, exhibit numerous crystals. They are almost entirely soluble in proof spirit.

PHARMACY.—1. *Officinal Preparations:* The officinal preparations of aloes are numerous, but they may be conveniently arranged as follows :—

A. Preparations common to both varieties.

a. Aloin. (*See* NEUTRAL PRINCIPLES.)

b. Enema Aloes.

Aloes, gr. 40
Carbonate of potassium, gr. 15
Mucilage of starch, fl ℥ 10.
} Mix and rub together.

c. Extractum Aloes { *Barbadensis.* / *Socotrinæ.*

A *watery extract*, made by thoroughly mixing Barbadoes or Socotrine aloes, in small frag-

ments, with boiling distilled water C 1; setting aside for 12 hours; pouring off the clear liquid; stirring the remainder; and evaporating the mixed liquors by a current of warm air to dryness.

c. Pilula Aloes { *Barbadensis.* / *Socotrinæ.*

Barbadoes or Socotrine Aloes, in powder, ℥ 2
Hard soap, in powder, ℥ 1
Oil of caraway (in Barbadoes), fl ʒ 1
Oil of nutmeg (in Socotrine), fl ʒ 1
Confection of roses, ℥ 1.

Beat all together until thoroughly mixed.

B. Special Preparation of Barbadoes Aloes.

a. Pilula Aloes et Ferri.

Barbadoes aloes, in powder, 2
Sulphate of iron, $1\frac{1}{2}$
Compound powder of cinnamon, 3
Confection of roses, 4

Powder the sulphate, rub with the other powders, add the confection, and make into a uniform mass.

C. Special Preparations of Socotrine Aloes.

a. Decoctum Aloes Compositum. (Baume de vie.)

Extract of Socotrine aloes, $\frac{1}{2}$
Myrrh, Saffron, Carbonate of potassium — of each, $\frac{1}{4}$
Extract of Liquorice, ℥ 2
Compound tincture of cardamoms, fl ℥ 15
Distilled water, a sufficiency.

Boil the solid ingredients (except saffron) gently with O 1 of water for five minutes; add the saffron; cool; add the tincture of cardamoms; macerate for 2 hours; strain through flannel; and pour water over the contents of the strainer to make fl ℥ 50.

This preparation should be kept in vessels from which air is excluded as far as possible.

b. Pilula Aloes et Asafœtidæ.

Socotrine aloes, in powder, 1 Asafœtida, 1 Hard soap, in powder, 1 Confection of roses, about 1.	Beat all together until thoroughly mixed.

c. Pilula Aloes et Myrrhæ.

Socotrine aloes, 2 Myrrh, 1 Dried saffron, ½ Treacle, 1 Glycerine, a sufficiency.	Triturate the aloes, myrrh, and saffron together; add the treacle and glycerine, and beat into a uniform mass.

d. Tinctura Aloes.

Socotrine aloes, in coarse powder, ℥ ½ Extract of Liquorice, ℥ 1½ Proof spirit, a sufficiency.	Macerate for 7 days in fl ℥ 15 of spirit; filter; press; and make up to O 1.

e. Vinum Aloes.

Socotrine aloes, ℥ 1½ Ginger, in coarse powder, gr. 80 Cardamom seeds, bruised, gr. 80 Sherry, O 2.	Macerate for 7 days; filter; and make up to O 2.

2. The *other preparations* in which aloes or its preparations are contained, are as follows :—

Barbadoes Aloes in

- Pilula Cambogiæ Composita.
- ,, Colocynthidis Composita.
- ,, ,, et Hyoscyami.

Socotrine Aloes in

- Extractum Colocynthidis Compositum.
- Pilula Rhei Composita.
- Tinctura Benzoini Composita.

ACTION.—Aloes is a **stomachic tonic; purgative,** acting slowly and especially on the colon; **hepatic stimulant;** and **emmenagogue.**

Doses—Of Aloes, gr. 2 to 6; Extract, gr. 2 to 6; Compound Decoction, fl ℥ ½ to 2; either Pill, gr. 5 to 10; Tincture, fl 3 1 to 2; Wine, fl 3 1 to 2.

2. **Catechu—Catechu.**—An *extract* of the leaves and young shoots of *Uncaria Gambier. N.O.* **Cinchonaceæ.** Catechu consists chiefly of catechu-tannic acid and catechin, mixed with gum.

CHARACTERS.—*a.* Catechu occurs in cubes, about an inch square; or in masses of variable size, formed of more or less agglutinated cubes.

b. Externally deep reddish-brown; internally pale cinnamon-brown.

c. Dry; breaking readily with a dull, earthy fracture.

d. Entirely soluble in boiling water.

e. Taste at first bitter, and very astringent, but subsequently sweetish; no odour.

f. The decoction, when cooled, is not rendered blue by iodine. (Absence of starch.)

g. Under the microscope presents myriads of very small acicular crystals.

PHARMACY.—1. *Officinal Preparations:*—

a. Infusum Catechu.

Catechu, in coarse powder, gr. 160 Cinnamon bark, bruised, gr. 30 Boiling distilled water, fl ℥ 10.	Infuse half an hour, and strain.

b. Pulvis Catechu Compositus.

Catechu, 4 Kino, 2 Rhatany, 2 Cinnamon, 1 Nutmeg, 1.	Powder and mix thoroughly; pass through a fine sieve; and finally rub lightly in a mortar.

c. Tinctura Catechu.

Catechu, in coarse powder, ℥ 2½ Cinnamon bark, bruised, ℥ 1 Proof spirit, O 1.	Macerate 7 days; strain, press, filter; and make up to O 1.

d. Trochisci Catechu.—Made in the ordinary way. Each lozenge contains gr. 1 of Catechu.

2. *Incompatibles.*—Alkalies; metallic salts; gelatine.

Action.—Catechu is a powerful **astringent**, and is used both locally and internally for this purpose.

Doses—Of Catechu, gr. 10 to 30; Infusion, fl ℥ 1 to 2; Compound Powder, gr. 20 to 40; Tincture, fl ʒ ½ to 2; Lozenges, 1 to 6.

3. **Elaterium.**—A sediment from the juice of the Squirting Cucumber fruit. *Ecbalium officinarum. N.O.* **Cucurbitaceæ.** Its active principle is *Elaterin*, a neutral substance.

Preparation.—Cut the very nearly ripe fruit lengthwise, and lightly press out the juice. Strain through a hair-sieve, and set it aside to deposit. Carefully pour off the supernatant liquid; pour the sediment on a linen filter; and dry it on porous tiles in a warm place. The decanted fluid may deposit a second portion of sediment, which can be dried in the same way.

Characters and Tests.—*a.* Elaterium occurs in light, friable, flat or slightly curved, opaque cakes, about $\frac{1}{10}$ inch thick.

b. Colour is pale green, greyish-green, or yellowish-grey, according to age. Fracture finely granular.

c. Odour faint, tea-like; taste bitter and acrid.

d. Elaterium yields half its weight to boiling rectified spirit.

e. It does not effervesce with acids. Boiled with water and the cooled mixture treated with iodine, it affords little or no blue colour. It should yield 25 per cent., or not less than 20 per cent. of elaterin.

ADULTERATIONS.—Chalk and starch.

PHARMACY.—Elaterium is not now made into any officinal preparation, but it is the source of *Elaterin.* (*See* NEUTRAL PRINCIPLES.)

ACTION.—Elaterium is a powerful **hydragogue purgative.** *Dose*—gr. $\frac{1}{16}$ to $\frac{1}{2}$.

4. **Gutta Percha.**—The *concrete juice* of *Dichopsis gutta;* and of several other trees of the *N.O.* **Sapotaceæ.**

CHARACTERS.—*a.* Gutta percha is in tough, somewhat flexible pieces, of a light brown or chocolate colour; plastic above 120°.

b. Insoluble in water, alcohol, alkaline solutions, or dilute acids; but almost entirely soluble in chloroform, and entirely so in oil of turpentine, carbon disulphide, or benzol.

PHARMACY.—*Officinal Preparation:*—

Liquor Gutta Percha.—Dissolve Gutta Percha, in thin slices, ℥ 1, in Chloroform, fl ℥ 6; add Carbonate of Lead dissolved in Chloroform, fl ℥ 2; shake several times; set aside until the insoluble matter has subsided; decant the clear liquid, and keep it in a well-stoppered bottle.

Liquor gutta percha is used in the preparation of *Charta Sinapis.*

ACTION.—The solution of gutta percha is **protective,** a film remaining after the evaporation of the chloroform. Gutta percha is much used in surgical practice.

5. **Kino.**—The *juice* obtained from incisions made in the *trunk* of *Pterocarpus Marsupium*, inspissated without artificial heat. *N.O.* **Leguminosæ.** Kino consists mainly of kino-tannic acid, with kino-red, gum, and other substances.

CHARACTERS.—*a.* Kino occurs in small angular brittle fragments.

b. Glistening, opaque, reddish-black; in thin laminæ, and at the edges, transparent and ruby-red.

c. Almost entirely soluble in rectified spirit. It yields little or nothing to ether.

d. Inodorous; very astringent taste, and when chewed sticks to the teeth, and tinges the saliva blood-red.

PHARMACY.—1. *Officinal Preparations:*—

a. Pulvis Kino Compositus.

Kino, 15 Opium, 1 Cinnamon bark, 4.	Powder and mix thoroughly; pass through a fine sieve; and rub lightly in a mortar.

b. Tinctura Kino.

Kino, in coarse powder, ℥ 2 Glycerine, fl ℥ 3 Distilled water, fl ℥ 5 Rectified spirit, fl ℥ 12.	Macerate 7 days; filter; and make up with rectified spirit to O 1.

2. *Kino* is an ingredient in Pulvis Catechu Compositus.

3. *Incompatibles.*—Mineral acids; alkalies and their carbonates; metallic salts; gelatine.

ACTION.—Kino is an **astringent,** both locally used and internally administered.

Dose—Of Kino, gr. 10 to 30; Compound Powder, gr. 5 to 20; Tincture, fl. 3½ to 2.

6. **Manna.**—A *concrete saccharine exudation* obtained by making incisions in the *stems* of cultivated trees of *Fraxinus Ornus*. *N.O.* **Oleaceæ**. It consists principally of *Mannite*, $C_6H_6(HO)_6$ (from 60 to 80 per cent.), with common sugar and indefinite matter. It contains about 10 per cent. of moisture.

CHARACTERS AND TESTS.—*a.* Manna forms stalactitic pieces, varying in length and thickness, irregularly convex, flat or concave on their inner surface.

b. Of a pale yellowish-brown colour, and nearly white externally.

c. Manna is crisp, brittle, porous, and crystalline in texture.

d. Odour faint, resembling honey; taste sweet and honey-like, combined with a slight acridity and bitterness.

e. Manna is readily soluble in water (about 1 in 6).

f. Mannite may be extracted by boiling manna with 15 or 16 parts of rectified spirit, from which it will afterwards separate on cooling in colourless, shining crystals; it requires 5 parts of cold water for its solution, and this does not undergo vinous fermentation in contact with yeast.

ACTION.—Manna is a pleasant **laxative**.

Dose—gr. 60 to ℥ 1.

7. **Opium.**—The *juice* obtained in Asia Minor by incision from the unripe capsules of *Papaver somniferum*, inspissated by spontaneous evaporation. *N.O.* **Papaveraceæ**. Opium is a very complex substance, consisting of several alkaloids, acids, neutral principles, gum, resin, salts, extractive matters, &c.

There are several known varieties of opium, including Turkey (Smyrna and Constantinople), Egyptian, East Indian, Persian, and European. The B. P. directs that any ordinary variety of opium may be employed as a source of alkaloids; but, otherwise

used for officially recognised purposes, opium must be that obtained in Asia Minor, and must be of such a strength that, when dried and powdered and the powder heated to 212°, until it ceases to lose moisture, and the product tested by any trustworthy method, it shall yield, as nearly as practicable, 10 per cent. of morphine; that is, 100 parts of such dry powdered opium shall yield not less than 9·5 parts, and not more than 10·5 parts of morphine.

CHARACTERS.—*a.* Opium occurs in rounded, irregularly-formed, or flattened masses, varying in weight, but commonly from about eight ounces to two pounds, usually covered with portions of poppy leaves, and scattered over with the reddish-brown chaffy fruits of a species of Rumex.

b. When fresh it is plastic, and internally somewhat moist, coarsely granular, and reddish- or chestnut-brown; but becoming harder by keeping, and darkening to blackish-brown.

c. Odour strong, peculiar, narcotic; taste nauseously bitter.

IMPURITIES AND ADULTERATIONS.—Opium differs widely in its strength in various specimens, and the B. P. describes fully a *quantitative test* to determine that it contains the due proportion of morphine mentioned above. (*See* B. P., p. 296.) Moreover, it sometimes has its active principles removed before it is sold; and may also contain certain adulterations, namely, vegetable extracts; sugar and treacle; mechanical admixtures (sand, clay, stones, bullets, &c.); and water.

PHARMACY.—1. *Officinal Preparations:*—

The preparations containing opium are numerous, and it will be well to give a complete list of them here, with the proportion in each, but only those will be considered fully which are not alluded to elsewhere. They may be arranged in the following way:—

A. Preparations for External Use.

a. Emplastrum Opii = 1 in 10.

Opium, in finest powder, 1
Resin plaster, 9.

Melt the plaster by a water-bath, and mix the opium by degrees.

b. Linimentum Opii = 1 of Tincture in 2.

Tincture of Opium, 1
Liniment of Soap, 1.

Mix and filter.

c. Unguentum Gallæ cum Opio = 1 in $14\frac{2}{3}$.

B. Preparations for Internal Use.

a. Confectio Opii = 1 in 40, nearly.

Compound powder of opium, gr. 1
Syrup, 3.

Mix.

b. Extractum Opii. gr. $\frac{1}{2}$ = about gr. 1 of opium. Should yield about 20 per cent. of morphine. Made by three successive macerations of powdered opium in distilled water, and expression; mixing the liquors; straining through flannel; and evaporating by a water-bath.

c. Extractum Opii Liquidum = 22 grains of Extract in fl ʒ 1, nearly. Should yield about 1 per cent. of morphine. Sp. gr. 0·985 to 0·995.

Extract of opium, ʒ 1
Distilled water, fl ʒ 16
Rectified spirit, fl ʒ 4.

Macerate the extract in the water for an hour, stirring frequently; add the spirit; and filter.

d. Pilula Saponis Composita = 1 in 6, nearly.

Opium, in powder, 1
Hard soap, in powder, 4
Glycerine, a sufficiency.

Mix the opium and soap, and beat into a uniform mass with glycerine.

e. Pilula Ipecacuanhæ cum Scilla. Made with Dover's powder = 1 of opium in 23, nearly.

f. Pilula Plumbi cum Opio = 1 in 8.

g. Pulvis Cretæ Aromaticus cum Opio = 1 in 40.

h. Pulvis Ipecacuanhæ Compositus = 1 in 10.

i. Pulvis Kino Compositus = 1 in 20.

j. Pulvis Opii Compositus = 1 in 10.

Opium, 3
Black pepper, 4
Ginger, 10
Caraway fruit, 12
Tragacanth, 1.

Powder separately, and mix.

k. Tinctura Camphoræ Composita = gr. 1 in fl ʒ ½.

l. Tinctura Opii contains the soluble matter of 33 grains of opium, nearly, in fl ʒ 1 = gr. 1 in ♏ 14⅔; or about 3·3 grains of morphine in fl ʒ 1 = about 0·75 per cent. of morphine, or about 1¼ per cent. of bimeconate of morphine, besides the other alkaloidal salts of opium.

Opium, in powder, ʒ 1½
Proof spirit, O 1.

Macerate 7 days; strain, press, and filter; and make up to O 1.

m. Tinctura Opii Ammoniata contains the soluble matter of 0·62 of opium in fl 3 1, or gr. 5 in fl ʒ 1 = gr. 1 in ♏ 96.

Opium, in powder, gr. 100
Saffron, cut small, gr. 180
Benzoic acid, gr. 180
Oil of anise, fl 3 1
Strong solution of ammonia, fl ʒ 4
Rectified spirit, fl ʒ 16.

Macerate 7 days with occasional agitation; strain, press, and filter; and make up to O 1.

n. Trochisci Opii = gr. $\frac{1}{10}$ of *Extract of Opium* in each lozenge = gr. $\frac{1}{50}$ of morphine. Made with tincture of tolu, refined sugar, gum acacia, and extract of liquorice.

o. Vinum Opii contains gr. 22 of *Extract of Opium*, nearly, in fl ℥ 1 = about gr. ½ of morphine in fl ʒ 1.

Extract of opium, ℥ 1 Cinnamon, bark, bruised, gr. 75 Cloves, bruised, gr. 75 Sherry wine, O 1.	Macerate 7 days, with occasional agitation, and filter.

C. Preparations administered per rectum.

a. Enema Opii.

Tincture of opium, fl ʒ ½ Mucilage of starch, fl ℥ 2.	Mix.

b. Suppositoria Plumbi Composita = gr. 1 in each.

2. Opium is the source of the alkaloids, morphine and codeine; and also of meconic acid.

3. *Incompatibles.* The chief drugs chemically incompatible with opium are alkaline carbonates; lime-water; salts of lead, iron, copper, mercury, and zinc; preparations of arsenium; and vegetable astringents. It is often given, however, in combination with some of these incompatibles.

Action.—Opium is one of the most important drugs in the Pharmacopœia, and its actions are numerous and somewhat complicated. *Externally* it is employed as an **anodyne** and **sedative**, and some of its officinal preparations are intended for this purpose. *Internally* its effects may be considered in relation to the different systems. In connection with the alimentary canal opium acts as an **anodyne**,

sedative, and **anti-spasmodic,** and under certain circumstances is valuable as a **paralyser of the intestines**; moreover it diminishes all the digestive secretions, and is much employed as an **astringent.** Minute doses of tincture of opium are said to act sometimes as an **aperient** (Brunton). The enema and suppository are of much service as **local sedatives** or **anodynes** in connection with the rectum and anus. Some of the most prominent effects of opium are produced upon the nervous system, this drug being at first a **cerebral stimulant** or **excitant,** and subsequently an **anodyne, hypnotic,** or **narcotic,** according to its dose. In some animals opium is a marked **spinal stimulant,** at the same time exciting the motor nerves, and thus muscular disorders of a spasmodic or convulsive character are produced; in man more or less muscular excitement may be caused for a short time, but subsequently the motor centres and nerves tend to become depressed, and opium is consequently used as an **anti-spasmodic.** In connection with the eyes, opium acts as a **myotic** when administered internally. It is not, however, used for this purpose, but the degree of contraction of the pupils affords an indication as to how far the system is under the influence of the drug. With regard to the circulatory system, opium is temporarily a **cardiac** and **vascular stimulant,** but afterwards becomes a **sedative,** and ultimately a **cardiac depressant;** it acts as a serviceable **hæmostatic** in many cases. It is a valuable **pulmonary sedative,** being sometimes smoked for this purpose, and also diminishes the bronchial secretion; in large doses, and under certain circumstances even in small doses, it becomes a dangerous **pulmonary depressant.** The only secretion or excretion which opium does not diminish is the sweat, this drug being a **diaphoretic,** especially in certain combinations. It may be used as an **anti-diuretic**; and has

in many cases a remarkable influence in lessening the amount of sugar passed with the urine in cases of diabetes, this effect being supposed to be due to its modifying influence upon the glycogenic function of the liver and upon general metabolism. In relation to the sexual organs, opium is regarded as an aphrodisiac.

Opium is one of the drugs the effects of which need to be closely watched. After a full dose there are usually unpleasant symptoms, namely, a clammy or dry mouth, furred tongue, thirst, loss of appetite, constipation, and headache. Beyond a certain point, or under special conditions, it becomes dangerous as a narcotic poison, and cardiac and respiratory depressant. As already mentioned, the state of the pupils is an important indication of the effects of opium on the system. These are much influenced by age, sex, habit, nature of the disease, and idiosyncrasy.

Doses—Of Opium, gr. ½ to 3; Confection, gr. 5 to 20; Extract, gr. ½ to 2; Liquid Extract, ♏ 10 to 40; Compound Soap Pill, gr. 3 to 5; Pill of Ipecacuanha with Squill, gr. 5 to 10; Pill of Lead with Opium, gr. 3 to 5; Aromatic Powder of Chalk and Opium, gr. 10 to 40; Compound Ipecacuanha Powder, gr. 5 to 15; Compound Kino Powder, gr. 5 to 20; Compound Opium Powder, gr. 2 to 5; Compound Tincture of Camphor, ♏ 45 to fl 3 1; Tincture of Opium, ♏ 5 to 40; Ammoniated Tincture, fl 3 ½ to 1; Lozenges, 1 to 6; Wine, ♏ 10 to 40.

Group XV.—ALKALOIDS.

Several alkaloids are recognised in the B.P. as separate drugs, either alone or in the form of salts, which will now be enumerated in alphabetical order.

	Name.	Source.
1.	Aconitina	Aconiti Radix.
2.	Apomorphinæ Hydrochloras	Morphina or Codeina.
3.	Atropina	Belladonnæ Radix.
4.	Atropinæ Sulphas	Atropina.
5.	Beberinæ Sulphas	Nectandræ Cortex.
6.	Caffeina	Camellia Thea (leaves) and Caffea Arabica (seeds).
7.	Caffeinæ Citras	Caffeina.
8.	Cinchonidinæ Sulphas	Cinchonæ Cortex.
9.	Cinchoninæ Sulphas	
10.	Cocainæ Hydrochloras	Erythroxylon Coca (leaves).
11.	Codeina	Opium.
12.	Morphinæ Acetas Morphinæ Hydrochloras Morphinæ Sulphas	Opium.
13.	Physostigmina	Physostigmatis Faba (Alcoholic Extract).
14.	Pilocarpinæ Nitras	Jaborandi (Extract).
15.	Quininæ Hydrochloras Quininæ Sulphas	Cinchonæ Cortex.
16.	Strychnina	Nux Vomica.
17.	Veratrina	Sabadilla.

In discussing these alkaloids it will be more convenient to bring together those which are obtained from the same source, and also certain derivatives.

A. Alkaloids obtained from Opium.

1. **Morphina—Morphine.**—$C_{17}H_{19}NO_3$.

Morphine is the principal alkaloid present in *Opium*. *N.O.* **Papaveraceæ**. There are three of its salts separately recognized in the B.P., namely:—

1. **Morphinæ Acetas—Acetate of Morphine.**—$C_{17}H_{19}NO_3,HC_2H_3O_2,3H_2O$.

2. **Morphinæ Hydrochloras—Hydrochlorate of Morphine.**—$C_{17}H_{19}NO_3,HCl,3H_2O$.

3. **Morphinæ Sulphas—Sulphate of Morphine.**—$(C_{17}H_{19}NO_3)_2H_2SO_4,5H_2O$.

PREPARATION.—1. The *Hydrochlorate of Morphine* is ordered to be prepared directly from opium, by the following process:—

a. Macerate sliced *opium* in successive quantities of *cold water*, subjecting it finally to strong pressure; unite the decanted liquors; evaporate; and strain through calico.

(A concentrated infusion of *meconates* and *sulphates of morphine* and *codeine* is obtained, with resins, extractive matters, &c.)

b. Add a solution of *chloride of calcium*, and evaporate until the solution becomes solid on cooling.

(*Hydrochlorate of morphine* and *codeine* are formed.)

c. Subject the mass to powerful pressure, enveloped in a double fold of strong calico, preserving the dark fluid which exudes. Triturate the squeezed cake with *boiling distilled water;* wash it well on a paper filter with more boiling water; evaporate the filtered liquids as before, cool, solidify, and press; and if the mass be still much coloured, repeat this process again, always preserving the expressed fluids.

(The dark liquid contains colouring matters, &c., with a small proportion of alkaloids.)

d. Dissolve the pressed cake in *boiling distilled water;* digest with *purified animal charcoal* for 20 minutes; filter, and wash the filter and charcoal with boiling distilled water.

(The colouring matters are removed.)

e. Add *solution of ammonia* in slight excess. Collect the crystalline precipitate which separates as the liquid cools on a paper filter, and wash with cold distilled water until the washings cease to give a precipitate with solution of nitrate silver acidulated by nitric acid.

(*Morphine* is precipitated, *codeine* remains in solution; and the morphine is washed free from codeine.)

f. Diffuse the morphine through *boiling distilled water* in a porcelain capsule, kept hot; add *dilute hydrochloric acid* carefully, constantly stirring, until the morphine is entirely dissolved, and the solution is neutral.

(A solution of pure *hydrochlorate of morphine* is obtained.)

g. Set aside to cool and crystallise; drain and dry the crystals on filtering paper. More crystals may be obtained by further evaporating the mother liquor and cooling.

h. A small quantity of morphine may be obtained from the dark expressed liquids, by diluting them with water; precipitating with solution of potash in much excess; filtering; supersaturating the filtrate with hydrochloric acid; digesting with a little animal charcoal, and filtering; and adding solution of ammonia.

2. *Acetate of Morphine.*—This salt is usually prepared from the hydrochlorate, by precipitating the morphine by *solution of ammonia;* collecting, washing, and dissolving in *dilute acetic acid* to neutralization; evaporating by the heat of a water-bath, maintaining acetic acid in slight excess, until it concretes on cooling; drying at a slight heat; and reducing to powder.

Acetate of morphine may also be prepared from acetic acid and the pure morphine obtained direct from opium, as described in connection with the hydrochlorate.

3. *Sulphate of Morphine.*—This salt is prepared by diffusing morphine in about twice its weight of *boiling distilled water*, and adding to the fluid, kept hot, *diluted sulphuric acid*, gradually and with constant stirring, so that the morphine may be entirely dissolved, and a neutral solution is obtained. Set aside

to cool and crystallize. Drain and dry the crystals on filtering paper. More crystals may be obtained by further evaporating the mother liquor, and again cooling.

CHARACTERS AND TESTS.—Under this head the three salts of morphine may be considered together.

a. Acetate is a white powder. *Hydrochlorate* is in white powder or thin prisms of a silky lustre. *Sulphate* is in colourless, silky, acicular crystals.

b. They are all soluble in water (*acetate* 1 in $2\frac{1}{2}$, *hydrochlorate* and *sulphate* 1 in 24). The *acetate* and *hydrochlorate* are readily soluble in rectified spirit, the *sulphate* only sparingly.

c. They give a white precipitate with solution of potash, soluble in excess. Moistened with strong nitric acid, they become orange-red; and with solution of perchloride of iron, greenish-blue. The several salts yield the usual tests of their respective acids.

d. Ignited with free access of air, the salts of morphine leave no residue.

QUANTITATIVE TESTS.—1. *Acetate.* 20 grains form with 1 drachm of water a slightly turbid solution, which is rendered clear by the addition of 1 grain of acetic acid; and this solution when mixed with ammonia in slight excess yields a precipitate which, after washing with a little cold water and drying in a water-bath, weighs 15 grains.

2. *Hydrochlorate.* 20 grains dissolved in $\frac{1}{2}$ an ounce of warm water, with ammonia added in the slightest possible excess, gives on cooling a crystalline precipitate which, when washed with a little cold water and dried in a water-bath, weighs 16 grains.

PHARMACY.—1. *Officinal Preparations:*—

a. Injectio Morphinæ Hypodermica.—This is a solution of *acetate of morphine* = gr. 1 in ℥ 10. It is prepared from a solution of the *hydrochlorate,* by

precipitating the morphine by solution of ammonia; heating this gently with distilled water in a porcelain dish; carefully adding acetic acid until the morphine is dissolved, and a very slightly acid solution is formed; and then adding sufficient distilled water to make the solution of proper strength. Filter and preserve the product in a stoppered bottle excluded from the light.

b. Liquor Morphinæ { *Acetatis.* / *Bimeconatis.* / *Hydrochloratis.*

The strength of the *Solutions of Acetate* and *Hydrochlorate of Morphine* is about 1 in 100, and they are made by dissolving 9 grains of the respective salts in a mixture of:—

Diluted Acetic or Hydrochloric acid, ♏ 18
Rectified spirit, fl ʒ ½
Distilled water, fl ʒ 1½.

The B.P. directs that the acetate of morphine employed should be recently prepared, and of such quality that 20 grains will form a clear solution with fl ʒ 1 of water by the help of not more than gr. 1 of acetic acid. Solution of acetate of morphine may also be prepared by diluting 90 minims of *Injectio Morphinæ Hypodermica* with sufficient of a mixture of one volume of rectified spirit and two volumes of water to form 2 fluid ounces of the solution.

The *Solution of Bimeconate of Morphine* contains about 1¼ per cent. of the salt, or 5½ grains in fl ʒ 1. As regards meconate of morphine, it is about the same strength as tincture of opium. It is prepared by precipitating the morphine from a solution of 9 grains of the hydrochlorate by solution of ammonia; mixing this with sufficient distilled water to produce fl ʒ 1½; adding rectified spirit, fl ʒ ½, and meconic acid, gr. 6; and dissolving.

c. Suppositoria { *Morphinæ.* / *Morphinæ cum Sapone.*

These preparations both contain the *Hydrochlorate of Morphine* = gr. $\frac{1}{2}$ in each. *Suppositoria Morphinæ* are made up with oil of theobroma. *Suppositoria Morphinæ cum Sapone* with glycerine of starch, curd soap, and starch.

d. Trochisci { *Morphinæ.* / *Morphinæ et Ipecacuanhæ.*

These lozenges also contain the *Hydrochlorate of Morphine* = gr. $\frac{1}{36}$ in each, combined in the latter with *Ipecacuanha*, gr. $\frac{1}{12}$. They are made up with tincture of tolu, refined sugar, gum acacia, and mucilage.

2. *Hydrochlorate of Morphine* is an ingredient in *Tinctura Chloroformi et Morphinæ* = gr. 1 in fl ℥ 1.

3. *Incompatibles.*— Alkalies and alkaline earths; astringent vegetable infusions and decoctions.

Action.—Morphine possesses most of the actions of opium, which owes its chief effects to this alkaloid (*See* Opium.) At the same time there are certain differences to be noted in this respect, as well as in their modes of use. It is questionable whether morphine can be absorbed by the entire skin, but it is sometimes thus applied as an **anodyne**, and an oleate (non-officinal) is especially used for this purpose. The alkaloid was formerly much employed endermically, but this practice is now seldom carried out. Morphine is considered to be more irritating to certain mucous surfaces, such as the conjunctiva, than opium, and the latter is therefore preferred as a local application to these structures.

Internally morphine has decidedly less action upon the alimentary canal than opium, except, perhaps, as a **gastric sedative** or **anodyne**, and is much less likely to cause constipation and other digestive derangements. It is, however, on this account of far less value therapeutically in connection with this apparatus. The alkaloid is more quickly absorbed,

and its remote effects are therefore more rapidly produced, but of shorter duration. As a rule morphine is to be recommended in preference to opium as an **anodyne, hypnotic,** or **anti-spasmodic,** and it has none of the excito-motor or convulsant action which belongs to some of the other constituents of this complex drug. It has also the advantage that it can be administered hypodermically. Morphine is less **diaphoretic** than opium, but at the same time a full dose will sometimes produce a very free action of the skin. This drug is very valuable as a **pulmonary** or **cardiac sedative.** It is in certain respects an **antagonist** to atropine, and the two drugs are now often administered together, especially subcutaneously; while they are also employed as mutual physiological **antidotes** in cases of poisoning by the alkaloids themselves, or by opium or belladonna respectively. Morphine is not much used for the other effects mentioned under opium, in relation to the urinary system, &c.

Doses—Of Acetate, Hydrochlorate, or Sulphate of Morphine, gr. $\frac{1}{8}$ to $\frac{1}{2}$; Solution of Acetate or Hydrochlorate, ♏ 10 to 60; Solution of Bimeconate, ♏ 5 to 40; Hypodermic Injection, ♏ 1 to 5; either Lozenge, 1 to 6.

2. Codeina—Codeine.—$C_{18}H_{21}NO_3,H_2O$.

Source and Preparation.—An alkaloid contained in *Opium*, and separated from the ammoniacal liquors from which morphine has been obtained, by evaporating, treating the residue with water, precipitating with caustic potash, and purifying the precipitated alkaloid by recrystallization from ether.

Characters and Tests.—*a.* In colourless or nearly colourless octahedral crystals.

b. Soluble in 80 parts of water and of solution of ammonia, readily soluble in spirit and in diluted acids.

c. The aqueous solution has a bitter taste; and an alkaline reaction.

d. The alkaloid dissolves in sulphuric acid, forming a colourless solution, which, when gently warmed with molybdate of ammonium or a trace of perchloride of iron, assumes a deep blue colour. Moistened with strong nitric acid it becomes yellow but not red.

ACTION.—Codeine is chiefly employed in the treatment of diabetes, having a marked effect in diminishing the quantity of sugar in the urine, and in some cases curing the disease. It is also a *pulmonary sedative*, relieving cough.

Dose—gr. $\frac{1}{4}$ to 2.

3. Apomorphinæ Hydrochloras — Hydrochlorate of Apomorphine.—$C_{17}H_{17}NO_2$, HCl.

SOURCE AND PREPARATION.—The hydrochlorate of an alkaloid, obtained by heating morphine or codeine in sealed tubes with hydrochloric acid.

CHARACTERS AND TESTS.—*a.* Small, greyish-white, shining, acicular crystals, turning green on exposure to light and air.

b. Inodorous; with a very faint acid reaction on moistened litmus paper.

c. Soluble in 7 parts of water, and 50 parts of alcohol, the solutions being decomposed, with production of a green colour, when boiled.

d. From solutions, bicarbonate of sodium throws down a precipitate which becomes green on standing, and then forms a purple solution with ether, violet with chloroform, and bluish-green with alcohol. With dilute solution of perchloride of iron it gives a deep red, and with nitric acid a blood-red coloration.

PHARMACY.—*Officinal Preparation:—*

Injectio Apomorphinæ Hypodermica.

Hydrochlorate of apomorphine, gr. 2 } Dissolve
Camphor water, ♏ 100. } and filter.

ACTION.—Apomorphine is chiefly employed as an **indirect emetic.** In minute doses it is also given as an **expectorant.** It must be used with caution, as it may cause dangerous prostration and interference with the respiratory and cardiac functions. It is generally administered hypodermically.

Dose—Of Hypodermic Injection, ♏ 2 to 8.

B. ALKALOIDS OBTAINED FROM CINCHONA.

1. **Quinina—Quinine.**—$C_{20}H_{24}N_2O_2$.

Two salts of quinine are now officinal in the B.P., namely :—

1. **Quininæ Hydrochloras—Hydrochlorate of Quinine.**—$C_{20}H_{24}N_2O_2HCl,2H_2O$.

2. **Quininæ Sulphas—Sulphate of Quinine.**—$((C_{20}H_{24}N_2O_2)_2H_2SO_4)_2,15H_2O$.

SOURCE AND PREPARATION.—The salts of quinine are obtained from various kinds of *Cinchona* and *Remijia* bark. *N.O.* **Cinchonaceæ.** With regard to their preparation, the B.P. merely states that they are prepared from the powder of the bark, by extraction with spirit after the addition of lime, or by the action of an alkali on an acidulated aqueous infusion, with subsequent neutralization of the alkaloid by hydrochloric or sulphuric acid respectively, and purification of the resulting salt. The hydrochlorate may be converted into the sulphate by dissolving it together with an equal weight of sulphate of sodium in ten times its weight of hot distilled water, and setting the mixture aside at 60° for half-an-hour.

CHARACTERS AND TESTS.—*a.* The salts of quinine occur in filiform, silky, snow-white crystals, those of the hydrochlorate being generally somewhat the larger.

b. The *sulphate* is sparingly soluble in water (1 in 700 or 800), the solution being fluorescent, presenting a peculiar bluish tint; in rectified spirit (1 in 40); entirely soluble in water acidulated by sulphuric acid. It dissolves in pure sulphuric acid, with a feeble yellowish tint, and undergoes no further change of colour when gently warmed. The *hydrochlorate* is much more soluble in water (1 in 34), and in spirit (about 1 in 3), and very soluble in the boiling liquids.

c. Quinine has a pure intensely bitter taste.

d. When a solution of either salt is treated with chlorine water, and then with ammonia, an emerald green colour is produced. Solution of ammonia gives a white precipitate of quinine, soluble in excess, and in ether.

e. Dried at 212°, 25 grains of freshly prepared sulphate lose 3·8 grains; the hydrochlorate loses 9 per cent.

f. Ignited with free access of air, both salts burn without leaving any residue.

IMPURITIES.—The B.P. gives details for testing the amount of cinchonine, cinchonidine, quinidine, and cupreine in sulphate of quinine. (*See* B. P., p. 343.) It states that this salt should not contain much more than 5 per cent. of sulphates of other cinchona alkaloids.

PHARMACY.—1. *Officinal Preparations:—*

a. Tinctura Quininæ.

Hydrochlorate of quinine, gr. 160 Tincture of Orange peel, O 1.	Dissolve with a little heat; filter after standing three days.

b. Tinctura Quininæ Ammoniata.

Sulphate of quinine, gr. 160 Solution of ammonia, fl ℥ 2½ Proof spirit, fl ℥ 17½.	Dissolve in the spirit with a little heat, and add the solution of ammonia.

c. Vinum Quininæ.

Sulphate of quinine, gr. 20 Citric acid, gr. 30 Orange wine, O 1.	Dissolve the citric acid, and then the quinine; filter after standing three days.

2. *Quinine*, precipitated from the sulphate, is contained in Ferri et Quininæ Citras = 16 in 100.

Action.—Locally applied, quinine is a valuable **antiseptic** and **disinfectant**; and is used in certain special conditions, on account of its influence in checking the development and growth of organisms. Internally, according to the dose administered, quinine is chiefly employed as a **stomachic tonic, general tonic, antipyretic,** or **antiperiodic,** having also a marked curative influence in relation to the effects of malaria upon the system. It further checks the movements of leucocytes, and thus tends to diminish suppuration. Quinine has been recommended as an **emmenagogue.** It is a drug that needs caution in its administration; it not uncommonly disturbs the digestive organs, causing loss of appetite, digestive disorders, nausea or vomiting; while in large doses it gives rise to the phenomena termed "cinchonism" or "quinism," namely, headache, a feeling of frontal tension, noises in the ears, more or less deafness, disorders of vision, and giddiness; from still larger doses more dangerous symptoms occur, such as delirium, muscular weakness, convulsions, and cardiac failure. In some persons even small doses produce more or less of these effects.

They may often be obviated by administering the quinine with hydrobromic acid.

Doses.—Of Hydrochlorate or Sulphate of Quinine, gr. 1 to 10 or more; either Tincture, fl ʒ ½ to 2; Wine, fl ʒ ½ to 1.

2. Cinchonidinæ Sulphas—Sulphate of Cinchonidine.—$(C_{20}H_{24}N_2O)_2,H_2SO_4,3H_2O$.

Source and Preparation.—The sulphate of an alkaloid obtained from the bark of various species of *Cinchona*. *N.O.* **Cinchonaceæ.**

It may be obtained from the mother-liquors of the crystallization of sulphate of quinine by further concentration, purified by crystallisation from alcohol, and finally from hot water.

Characters and Tests.—*a.* In colourless silky crystals, usually acicular.

b. Soluble in water, alcohol, and ether; almost insoluble in chloroform or in solution of ammonia; readily soluble in diluted acids.

c. The solution in water has a bitter taste; and a neutral or faintly alkaline reaction.

d. It twists a ray of polarised light to the left, and when acidified is not distinctly fluorescent.

e. The solution yields a white precipitate with solution of tartarated soda, and in the filtrate from this mixture solution of ammonia occasions not more than a slight turbidity. It dissolves in pure sulphuric acid, with production of not more than a faint yellow coloration, and the fluid undergoes no apparent change when gently warmed.

f. 25 grains of the salt lose 1·76 grains of moisture on drying at 212°. When ignited in air no ash remains.

3. Cinchoninæ Sulphas—Sulphate of Cinchonine.—$(C_{20}H_{24}N_2O)_2, H_2SO_4, 2H_2O$.

Source and Preparation.—The sulphate of an alkaloid obtained from the bark of various species of *Cinchona* and *Remijia*. *N.O.* **Cinchonaceæ.**

It may be obtained from the mother-liquors of the crystallization of the sulphate of quinine, cinchonidine, and quinidine, by precipitating the alkaloid with caustic soda, washing it with spirit until free from other alkaloids, dissolving in sulphuric acid, and, after purifying the solution with animal charcoal, allowing to crystallize.

Characters and Tests.—*a.* Hard, colourless, short, prismatic crystals, with a vitreous lustre.

b. Soluble in water and in chloroform; almost insoluble in ether and in solution of ammonia; readily soluble in rectified spirit and in diluted acids.

c. The aqueous solution has a bitter taste, and a neutral or faintly alkaline reaction.

d. The solution twists a ray of polarized light to the right; its acidified solution is not fluorescent.

e. The salt dissolves in pure sulphuric acid without change of colour, and the fluid undergoes no apparent change when gently warmed.

f. 25 grains of the salt should lose 1·26 grains of moisture when dried at 212°, and should then almost wholly dissolve in 4 ounces by weight of chloroform. When ignited in air no ash remains.

Action.—The sulphates of cinchonine and cinchonidine have actions similar to those of quinine, for which they are employed as substitutes, but they are much less powerful and certain in their effects. Cinchonine is said to be from a third to half as powerful as quinine. (*See* Quinine.)

Dose—Of either Sulphate, gr. 1 to 10.

C. Alkaloids from various sources.

1. **Aconitina — Aconitine.** — Obtained from *Aconiti Radix*. *N.O.* **Ranunculaceæ.**

Preparation.—*a.* Coarsely powdered aconite root is heated to ebullition with *rectified spirit*; then cooled, and macerated for 4 days; and finally percolated until the root is exhausted.

b. The greater part of the spirit is distilled off, and the remainder is evaporated.

c. The residual extract is thoroughly mixed with *boiling distilled water*, and, on cooling, this is filtered through paper. (An infusion containing *salts of aconitine* is formed.)

d. Solution of ammonia is added to the filtered liquid in slight excess, and the mixture is gently heated over a water-bath. (Impure *aconitine* is precipitated.)

e. The precipitate is separated on a filter, dried, coarsely-powdered, and macerated in successive portions of pure *ether*, with frequent agitation. The several products are decanted, mixed, and the ether distilled off.

f. The dry extract (almost *pure aconitine*) is dissolved in warm water, acidulated with *sulphuric acid*. (A solution of *sulphate of aconitine* is formed.)

g. When the solution is cold, *solution of ammonia*, diluted with 4 times its bulk of distilled water, is cautiously added to precipitate the aconitine; which is washed on a filter with a small quantity of cold distilled water; and dried by slight pressure between folds of filtering paper and subsequent exposure to air.

Characters and Tests.—*a.* Aconitine is white, usually amorphous, solid.

b. It possesses strongly alkaline properties, and is precipitated from solutions of its salts by the caustic alkalis, but not by carbonate of ammonium or the bicarbonates of sodium or potassium.

c. Soluble in cold water (1 in 150); boiling water (1 in 50); and much more in alcohol, ether, and chloroform.

d. It melts when heated, and burns with a smoky flame, leaving no residue if ignited with free access of air.

PHARMACY—*Officinal Preparation:—*

Unguentum Aconitinæ.

Aconitine, gr. 8
Rectified spirit, fl ʒ ½
Benzoated lard, ℥ i.

Dissolve the aconitine in the spirit, and mix thoroughly with the lard.

ACTION.—Aconitine is only used externally as an **anodyne**; it causes a sensation of tingling and numbness. Internally it is a powerful poison.

2. **Atropina—Atropine.**—$C_{17}H_{23}NO_3$. Obtained from *Belladonnæ Radix*. *N.O.* **Atropaceæ.**

PREPARATION.—*a.* Recently dried belladonna root, coarsely powdered, is macerated in *rectified spirit* for 24 hours, with frequent stirring; and then exhausted by slow percolation. (The tincture contains *salts of atropine*, with colouring and resinous matters, &c.)

b. Slaked lime is added to this tincture in a bottle, which is then occasionally shaken several times. (Colouring matters are precipitated.)

c. Filter; add *diluted sulphuric acid* in very slight excess to the filtrate; and filter again. (The excess of lime is neutralized.)

d. Three-fourths of the alcohol is distilled off, and water added to the residue, which is rapidly evaporated until the liquor is reduced to one-third its volume, and

no longer smells of alcohol, and then allowed to cool. (A watery solution of *salts of atropine*, resins, sulphuric acid, and calcic sulphate is formed.)

e. Solution of *carbonate of potassium* is added very cautiously, with constant stirring, nearly to neutralization. Set aside for six hours (resin precipitated); filter; and add *carbonate of potassium* to a decided alkaline reaction. (*Atropine* is precipitated.)

f. The whole is mixed with *chloroform* in a bottle, by frequent brisk agitation, and the mixed liquids poured into a funnel furnished with a glass stop-cock. (The chloroform dissolves the *atropine*.)

g. When the chloroform solution has subsided, it is drawn off by the stop-cock, and the chloroform distilled off on a water-bath.

h. The residue of atropine is dissolved in warm *rectified spirit;* digested with *animal charcoal* (to decolorize it); and the solution filtered, evaporated, and cooled, until colourless crystals are obtained, which are those of *atropine*.

Characters and Tests.—*a.* Atropine is in the form of colourless acicular crystals.

b. Sparingly soluble in water (1 in 500); more in rectified spirit (1 in 8); and in ether (1 in 20).

c. The solution in water is alkaline; and has a bitter taste.

d. Atropine leaves no ash when burnt with free access of air.

e. It gives a citron-yellow precipitate with perchloride of gold.

Pharmacy.—*Officinal Preparations:*—

a. Atropinæ Sulphas. This is an important salt of atropine, which is made in the following way:—

Mix { Atropine, gr. 120 / Distilled water, fl 3 4 }; and add diluted

sulphuric acid gradually, stirring until the alkaloid is dissolved, and the solution is neutral. Evaporate to dryness under 100°.

Sulphate of atropine is nearly colourless; crystalline or pulverulent; soluble in water, the solution being neutral.

b. Lamellæ Atropinæ.—Discs of gelatine, with some glycerine, each weighing about $\frac{1}{50}$ grain, and containing $\frac{1}{5000}$ grain of sulphate of atropine.

c. Liquor Atropinæ Sulphatis = 1 per cent.

Sulphate of atropine, gr. 9
Camphor water, fl ʒ 16 ½. } Dissolve.

d. Unguentum Atropinæ.

Atropine, gr. 8
Rectified spirit, fl ʒ
Benzoated lard, ℥ 1. } Dissolve the atropine in the spirit, and mix thoroughly with the lard.

Action.—The effects of atropine upon the system are described under belladonna, which owes its activity to this alkaloid. (*See* Belladonna Root.) Atropine itself is only used for the following purposes:—

Externally it is a powerful **anodyne**, and is employed in the form of ointment. Applied to the eye, either in the form of solution or disc, it is a **mydriatic**. Administered internally, or by subcutaneous injection, the solution acts as an **anhydrotic** and **cardiac sedative**. Atropine is regarded as an **antagonist** to morphine and eserine, and is consequently employed in poisoning by opium or calabar bean. A minute quantity is also administered hypodermically with morphine, to prevent the injurious effects of this drug.

Dose—Of Solution of Sulphate, ♏ 1 to 4.

3. **Beberinæ Sulphas—Sulphate of Beberine.** Prepared from the bark of *Nectandra Rodiæi*, the Bebeeru tree. *N.O.* **Lauraceæ**. It is probably a

mixture of sulphates of beberine ($C_{36}H_{42}N_2O_6$), nectandrine ($C_{40}H_{46}N_2O_8$), and other alkaloids.

PREPARATION.—*a.* Coarsely powdered *bebeeru bark* is moistened thoroughly with *sulphuric acid* mixed with water (fl ℥ ½ to C 1); allowed to macerate for twenty-four hours; and then percolated with the remainder of the acidulated water. (A solution of *sulphate of beberine*, with colouring matters, &c., is formed.)

b. The solution is concentrated; cooled; *milk of lime* gradually added, with agitation, but taking care that the fluid still retains a distinct acid reaction; and the mixture allowed to stand for two hours. (Colouring matters are precipitated.)

c. Filter through calico; wash the precipitate with a little cold water; and to the filtrate add *solution of ammonia* until it has a faint ammoniacal odour. (Impure *beberine* is precipitated.)

d. Collect the precipitate on a cloth; wash with cold water, squeeze gently with the hand, and dry by a water-bath; pulverize; exhaust by boiling with successive portions of *rectified spirit*; and mix them together. (A solution in spirit of nearly pure *beberine* is obtained.)

e. Add distilled water; distil to recover the spirit; and add by degrees, with constant stirring, *diluted sulphuric acid*, till the fluid has a slight acid reaction. (This is a solution of nearly pure *sulphate of beberine.*)

f. Evaporate to dryness on the water-bath; pulverize; pour on the powder gradually cold distilled water, stirring diligently; filter through paper; evaporate to a syrupy consistence; and dry in thin layers on porcelain or glass plates under 140°. Preserve in stoppered bottles.

CHARACTERS AND TESTS.—*a.* Sulphate of beberine occurs in thin scales, dark brown, translucent, yellow when in powder.

b. It is soluble in water, yielding a clear brown solution; and in alcohol.

c. It has a strong bitter taste.

d. The watery solution gives with caustic soda a yellowish-white precipitate, which is dissolved by agitating the mixture with twice its volume of ether. The ethereal solution, separated by a pipette and evaporated, leaves a yellow translucent residue, entirely soluble in dilute acids.

e. Ignited with free access of air, sulphate of beberine burns without residue.

ACTION.—Sulphate of beberine acts as a **bitter tonic, antiperiodic,** and **antipyretic.**

Dose—gr. 1 to 10.

4. { **Caffeina—Caffeine.**
   { **Caffeinæ Citras—Citrate of Caffeine.**

SOURCE AND PREPARATION. — 1. *Caffeine* is an alkaloid, C_8H_{10},N_4O_2,H_2O, (also named *Theine* and *Guaranine*), usually obtained from the dried leaves of *Camellia Thea*, *N.O.* **Ternstrœmiaceæ,** or the dried seeds of *Coffea Arabica*, *N.O.* **Cinchonaceæ,** by evaporating aqueous infusions from which astringent and colouring matters have been removed.

2. *Citrate of caffeine* is a weak compound of caffeine and citric acid, $C_8H_{10}N_4O_2,H_3C_6H_5O_7$, and is made in the following way:—

Dissolve { Citric acid, ℥ 1, / Distilled water, fl ℥ 2 }, and stir Caffeine, ℥ 1, into the heated solution. Evaporate to dryness in a water-bath, constantly stirring towards the end of the operation. Reduce to a fine powder.

CHARACTERS AND TESTS.—*a. Caffeine* is in colourless, silky, acicular crystals. The *citrate* is a white powder.

b. Both preparations are inodorous, but have a faintly bitter taste, the *citrate* being also acid.

c. Caffeine is neutral, but the *citrate* has an acid reaction on litmus.

d. Caffeine is soluble in 80 parts of cold water; more soluble in boiling water and rectified spirit, and very soluble in chloroform; sparingly soluble in ether. The *citrate* is soluble in a mixture of 2 parts of chloroform and 1 part of rectified spirit. With a little water it forms a clear syrupy solution, which on dilution yields a white precipitate of caffeine that redissolves when 10 parts of water have been added.

e. At 212° the crystals of *caffeine* lose 8·49 per cent. of their weight, and at a higher temperature melt and volatilize without decomposition. The *citrate*, heated in the air, chars and burns, leaving a mere trace of ash.

f. Tannic acid gives a white precipitate in an aqueous solution, soluble in excess. Treated with a crystal of chlorate of potassium and a few drops of hydrochloric acid, and the mixture evaporated to dryness in a porcelain dish, a reddish residue results, which becomes purple when moistened with solution of ammonia. These tests apply to *caffeine* and its *citrate*. The latter gives the usual test for citric acid.

ACTION.—Caffeine may be used as a **cerebral** or **nervine stimulant**. It is chiefly employed, however, as a **cardiac tonic** and **diuretic**, especially in the treatment of certain forms of dropsy.

Doses—Of Caffeine, gr. 1 to 5; Citrate, gr. 2 to 10.

5. Cocainæ Hydrochloras—Hydrochlorate of Cocaine.—$C_{17}H_{21}NO_4,HCl$.

SOURCE AND PREPARATION.—The hydrochlorate of an alkaloid obtained from the leaves of *Erythroxylon Coca*. *N.O.* **Erythroxylaceæ**. It may be obtained by agitating with ether an aqueous solution of an acidulated alcoholic extract, made alkaline with carbonate of sodium; separating and evaporating the ethereal liquid, purifying the product by repeating the treatment with acidulated water, carbonate of sodium,

and ether; decolorizing; neutralizing with hydrochloric acid, and recrystallizing.

CHARACTERS AND TESTS.—*a.* In almost colourless acicular crystals or crystalline powder.

b. Readily soluble in water, alcohol, and ether.

c. Its solution in water has a bitter taste, and produces on the tongue a tingling sensation followed by numbness.

d. The solution gives a yellow precipitate with chloride of gold; and a white precipitate with carbonate of ammonium, soluble in excess.

e. The salt dissolves without colour in cold concentrated acids, but chars with hot sulphuric acid. Ignited in the air it burns without residue.

PHARMACY.—*Officinal Preparation:*—

Lamellæ Cocainæ.—Discs of gelatine, with some glycerine, each weighing about $\frac{1}{50}$ grain, and containing gr. $\frac{1}{200}$ of hydrochlorate of cocaine.

ACTION.—Cocaine is mainly used as a **local anodyne** or **anæsthetic,** having a remarkable effect on mucous surfaces when applied to them; it speedily paralyses the sensory nerves, and causes anæmia by contracting the small vessels. It has been more especially employed in connection with the eye, throat, and larynx, but is now made use of in surgical practice in the performance of operations upon other mucous surfaces. It does not affect the skin, but produces more or less extensive anæsthesia when injected subcutaneously. Internally administered, the hydrochlorate of cocaine acts as a **stimulant** or **restorative,** like coca.

Dose—gr. $\frac{1}{5}$ to 1.

6. **Physostigmina—Physostigmine** or **Eserine.**—$C_{15}H_{21}N_3O_2$.

SOURCE AND PREPARATION.—An alkaloid obtained from the *Alcoholic Extract* of *Calabar Bean*, by

dissolving the extract in water, adding bicarbonate of sodium, shaking the mixture with ether, and evaporating the ethereal liquid.

CHARACTERS AND TESTS.—*a.* In colourless or pinkish crystals.

b. Slightly soluble in water, readily soluble in alcohol and in diluted acids.

c. The aqueous solution has an alkaline reaction.

d. When warmed or shaken with dilute solution of potash it becomes red, and when evaporated to dryness over a water-bath leaves a bluish residue, the acidified solution of which is beautifully dichroic, being blue and red.

PHARMACY.—*Officinal Preparations:*—

Lamellæ Physostigminæ. Discs of gelatine, with some glycerine, each weighing about $\frac{1}{50}$ grain, and containing gr. $\frac{1}{1000}$ of physostigmine.

ACTION.—Physostigmine has similar actions to Calabar bean, but is principally used as a **myotic**, locally applied to the eye. It has also been employed by subcutaneous injection as a **spinal depressant**, in the treatment of certain convulsive diseases; and as an **antagonist** to atropine and chloral.

7. **Pilocarpinæ Nitras—Nitrate of Pilocarpine.**—$C_{11}H_{16}N_2O_2,HNO_3$.

SOURCE AND PREPARATION.—The nitrate of an alkaloid obtained from *Extract of Jaborandi*, by shaking it with chloroform and alkali, evaporating the chloroformic solution, neutralizing the product with nitric acid, and purifying by recrystallization.

CHARACTERS AND TESTS.—*a.* In a white crystalline powder or in acicular crystals.

b. Soluble in 8 or 9 parts of water at common temperatures; slightly soluble in cold, freely soluble in hot rectified spirit.

c. Strong sulphuric acid forms with it a yellowish solution, which, on addition of bichromate of potassium, gradually acquires an emerald-green colour.

ACTION.—Pilocarpine is a powerful **diaphoretic**, and it is for this purpose that it is generally employed; on the other hand, in very minute doses it is recommended as an **anhydrotic.** It increases other secretions, such as the saliva, nasal, and bronchial secretions, and may thus be of service as a **sialagogue** or **expectorant.** Pilocarpine is regarded as an **antagonist** to atropine.

Dose—Of Nitrate, gr. $\frac{1}{20}$ to $\frac{1}{2}$.

8. **Strychnina—Strychnine.**—$C_{21}H_{22}N_2O_2$. An alkaloid prepared from *Nux Vomica.* *N.O.* **Loganiaceæ.**

PREPARATION.—*a.* Heat the split seeds to 212° for 3 hours, and then reduce them to powder.

b. Digest the powder for 12 hours with *rectified spirit* and *distilled water* (2 to 1), gently heating; strain through linen, express strongly, and repeat this process twice. (A tincture of salts of *strychnine* and *brucine*, with colouring matters, &c., is obtained.)

c. Distil off the spirit; evaporate the watery residue; and filter when cold.

d. Add a solution of *acetate of lead*, so long as it produces any precipitate; filter; and wash the precipitate with cold water, adding the washings to the filtrate. (Colouring matters, &c., are precipitated.)

e. Evaporate the clear liquid; when it has cooled, add *solution of ammonia* in slight excess, stirring thoroughly; and let the mixture stand 12 hours.

(*Strychnine* and *brucine*, with other matters, are precipitated.)

f. Collect the precipitate on a filter; wash it with cold water; dry in a water-bath or hot-air chamber;

boil with successive portions of *rectified spirit*, till the fluid scarcely tastes bitter; distil off most of the spirit; evaporate; and set aside to cool.

(*Strychnine*, with a little *brucine*, crystallizes out as a white adherent crust; *brucine* remains in solution.)

g. Cautiously pour off the mother liquor; and wash the crust on a paper filter with a mixture of *rectified spirit* and *distilled water* (2 to 1), till the washings cease to become red on the addition of nitric acid.

(*Brucine* is thus separated.)

h. Dissolve it by boiling in *rectified spirit*, and set aside to crystallize. More crystals may be obtained by evaporating the mother liquor.

CHARACTERS AND TESTS.—*a.* Strychnine occurs in minute crystals = right square octahedrons or prisms; colourless.

b. It has no odour; but an intensely bitter taste.

c. Sparingly soluble in cold water (1 in 5760), but imparts to the solution its bitter taste; boiling water (1 in 2500); soluble in boiling rectified spirit and in chloroform, but not in absolute alcohol or in ether.

d. It leaves no ash when burned with free access of air.

e. Strychnine is not coloured by sulphuric or nitric acid. With sulphuric acid and bichromate of potassium it acquires an intensely violet hue, speedily passing through red to yellow.

PHARMACY.—*Officinal Preparation:*—

Liquor Strychninæ Hydrochloratis = about 1 in 100.

Strychnine, in crystals, gr. 9 Diluted hydrochloric acid, ♏ 14 Rectified spirit, fl ℥ ½ Distilled water, fl ℥ 1½.	Dissolve the strychnine in the acid, mixed with fl ʒ 4 of water, by the aid of heat; add the spirit and remainder of the water.

ACTION.—Strychnine may be given as a **stomachic** and **general tonic.** Its most obvious physiological effect is that of a **spinal stimulant** or **excitant,** causing increasing reflex muscular activity, and ultimately becoming a **tetanizer.** Strychnine further acts as a **respiratory stimulant,** and a **cardiac stimulant** and **tonic.** It is regarded as an **antagonist** to morphine, physostigmine, and chloral, and has been recommended in cases of poisoning by these agents.

Dose—Of Strychnine, gr. $\frac{1}{30}$ to $\frac{1}{12}$; Solution, ♏ 5 to 10.

9. **Veratrina—Veratrine.** An alkaloid or mixture of alkaloids obtained from *Cevadilla*, not quite pure. *N.O.* **Melanthaceæ.**

PREPARATION.—*a.* Separate the seeds from the capsules, after macerating cevadilla in boiling water, squeezing, drying, and beating in a mortar, and grind them in a coffee-mill.

b. Make them into a thick paste with *rectified spirit*, and percolate until the spirit ceases to be coloured. (A tincture containing *gallate of veratrine*, resins, and other ingredients is formed.)

c. Concentrate by distillation so long as no deposit forms, and pour the residue, while hot, into twelve times its volume of cold distilled water. (Resins are precipitated.)

d. Filter through calico; wash the residue on the filter with distilled water until the fluid ceases to precipitate with ammonia, and to the united filtered liquids add *solution of ammonia* in slight excess. (Impure *veratrine* is precipitated.)

e. Collect the precipitate on a filter, and wash it with distilled water till the fluid passes through colourless. Diffuse the moist precipitate through distilled water, and add gradually *hydrochloric acid*,

diligently stirring, sufficient to make the fluid feebly but persistently acid. (A solution of impure *hydrochlorate of veratrine* is formed.)

f. Add *purified animal charcoal*, and digest with a little heat for 20 minutes, filter, and cool. (The solution is decolorized.)

g. Add *solution of ammonia* in slight excess; collect the precipitate on a filter, and wash it until the washings cease to be affected by nitrate of silver acidulated with nitric acid. Dry the precipitate, first by imbibition, with filtering paper, and then by the application of warmth.

CHARACTERS AND TESTS.—*a.* Veratrine is amorphous and pale grey.

b. It has no odour, but, even in the most minute quantity, is powerfully irritating to the nostrils; the taste is strongly and persistently bitter, and highly acrid.

c. Insoluble in water; soluble in rectified spirit (1 in 11), ether (1 in 6), and dilute acids, leaving traces of an insoluble brown resinoid matter.

d. Veratrine dissolves in nitric acid, yielding a yellow solution; and in sulphuric acid, forming a deep red solution, which exhibits a green fluorescence by reflected light. Warmed with hydrochloric acid, it dissolves with production of a blood-red colour.

e. Heated with access of air, it melts into a yellow liquid, and at length burns away, leaving no residue.

PHARMACY—*Official Preparation:*—

Unguentum Veratrinæ.

Veratrine, gr. 8 Hard Paraffin, ʒ ¼ Soft Paraffin, ʒ ¾ Olive Oil, fl ʒ 1.	Rub the veratrine and oil together; melt the paraffins, and during cooling mix the whole thoroughly in a mortar until cold.

Action.—Veratrine is merely employed externally as a **local anodyne**, in the form of ointment. Internally it is a powerful irritant and depressant poison, and is never given.

Group XVI.—NEUTRAL PRINCIPLES.

1. Aloin.—$C_{16}H_{18}O_7$.

Source and Preparation.—A crystalline substance extracted from *Aloes* by solvents, and purified by crystallization. As obtained from the different varieties of aloes, the products differ slightly, but their medicinal properties are similar.

Characters.—*a.* Aloin occurs usually in tufts of acicular crystals, of a yellow colour.

b. Inodorous; having the taste of aloes.

c. Sparingly soluble in cold water, more so in cold rectified spirit, freely soluble in the hot fluids. Insoluble in ether.

d. Aloin is not readily altered in acidified or neutral solutions; rapidly altered in alkaline fluids.

Action.—Aloin is given as a **purgative**, acting on the lower bowel.

Dose—gr. $\frac{1}{2}$ to 2.

2. Elaterinum—Elaterin.—$C_{20}H_{28}O_5$.

Source and Preparation.—Elaterin is the active principle of *Elaterium*. It may be obtained by exhausting elaterium with chloroform, adding ether to the chloroformic solution, collecting the precipitate, washing the latter with ether, and purifying by recrystallization from chloroform.

Characters and Tests.—*a.* Elaterin occurs in small colourless crystals.

b. It is insoluble in water, sparingly soluble in rectified spirit.

c. It has a bitter taste.

d. Heated with access of air, it first melts and then burns, leaving no residue.

e. With melted carbolic acid it yields a solution which, on the addition of sulphuric acid, acquires a crimson colour, rapidly changing to scarlet.

f. It is not precipitated from solution by tannic acid, nor by the salts of mercury or platinum.

PHARMACY.—*Officinal Preparation:*—

Pulvis Elaterini Compositus.

Elaterin, 1
Sugar of milk, 39.

Reduce to fine powder in a mortar, and mix intimately.

ACTION.—Elaterin is a powerful **hydragogue purgative.**

Doses—Of Elaterin, gr. $\frac{1}{40}$ to $\frac{1}{10}$; Compound Powder, gr. $\frac{1}{2}$ to 5.

3. Salicinum—Salicin.—$C_{13}H_{18}O_7$.

SOURCE AND PREPARATION.—A crystalline glucoside obtained by treating the bark of *Salix alba* and other species; and the bark of various species of *Populus*, with hot water, removing tannin and colouring matter from the decoction, evaporating, purifying, and recrystallizing.

CHARACTERS AND TESTS.—*a.* Salicin is in the form of colourless shining crystals.

b. It has a very bitter taste.

c. Soluble in about 28 parts of water or spirit at common temperatures; insoluble in ether.

d. Sulphuric acid colours it red. A small quantity heated with a little red chromate of potassium, a few

drops of sulphuric acid and some water, yields vapours of an oil having the odour of meadow-sweet.

e. The crystals melt when heated, and emit vapours having the odour of meadow-sweet. On ignition in air they leave no residue.

ACTION.—Salicin is chiefly employed as an **antipyretic**, and especially in the treatment of acute rheumatism. Its action is similar to that of salicylic acid, but it is less powerful; it has the advantage that it does not tend to cause so much vascular depression.

Dose—gr. 3 to 20.

4. Santoninum—Santonin.—$C_{15}H_{18}O_3$.

SOURCE AND PREPARATION.—A crystalline principle prepared from *Santonica*. *N.O.* **Compositæ**.

a. Boil bruised *Santonica* with two successive portions of *slaked lime* and *distilled water;* strain through a stout cloth, and express strongly; and mix the strained liquors. (A solution of *santonin* and oily matters, in combination with lime, is formed.)

b. Let the mixture settle; decant the fluid; evaporate; to the liquor, while hot, add *hydrochloric acid*, with diligent stirring, until the fluid has become slightly and permanently acid; and set aside for 5 days. (*Santonin* is precipitated; oil separates on the surface.)

c. Skim off the oil; carefully decant the greater part of the fluid; collect the precipitate on a paper filter; and wash it in succession with cold distilled water, diluted *solution of ammonia* (fl. ℥ ¼ to fl. ℥ 5), and again with cold distilled water. (Acids and colouring matters are removed.)

d. Dry the precipitate; scrape it from the filter; mix it with *purified animal charcoal;* digest with

rectified spirit for half an hour, and boil for 10 minutes. Filter while hot; wash the charcoal with boiling spirit (fl ℥ i); set aside the filtrate for 2 days in a cool dark place to crystallize. More crystals may be obtained by concentrating the mother liquor. (*Santonin* crystallizes out.)

e. Drain the crystals; purify them by re-dissolving in boiling spirit and recrystallizing; and dry them on filtering paper in the dark. Preserve in a bottle protected from light.

Characters and Tests.—*a.* Santonin occurs in flat rhombic prisms, colourless, but sunlight renders them yellow.

b. It has a feebly bitter taste.

c. Scarcely soluble in cold water, sparingly in boiling water, but abundantly in chloroform and boiling rectified spirit; not dissolved by diluted mineral acids.

d. Added to alcoholic solution of potash it yields a violet-red colour.

e. Ignited with free excess of air, it burns without leaving any residue.

Pharmacy.—*Officinal Preparation:*—

Trochisci Santonini = gr. i in each. Made in the usual way, with refined sugar, acacia, mucilage, and distilled water.

Action.—Santonin is an **anthelmintic**, especially used to destroy the round worm. It sometimes causes yellow vision, as well as unpleasant nervous and other symptoms.

Dose—Of Santonin, gr. 2 to 6; Lozenges, 1 to 6.

Group XVII.—SPECIAL ORGANIC ACIDS.

In this group are included certain peculiar acids derived from the vegetable kingdom, which are officinal in the B.P.

I. **Acidum Gallicum—Gallic Acid.**—$H_3C_7H_3O_5,H_2O$.
Acidum Tannicum — Tannic Acid or **Tannin.**—$C_{27}H_{22}O_{17}$.

Source and Preparation.—These two acids are obtained from *Galls*, in which tannic acid exists in the proportion of about 35 per cent., but gallic acid only amounts to about 5 per cent. The former therefore is merely *extracted* from the galls; the latter is *prepared* by a process by which the tannic acid is changed into gallic acid and glucose. The methods of obtaining the two acids may be thus contrasted:—

Tannic Acid.	Gallic Acid.
a. Expose *powdered galls* to a damp atmosphere for 2 or 3 days, and afterwards add sufficient *ether* to form a soft paste.	*a.* Boil 1 part of *coarsely-powdered galls* with 4 fluid parts of *diluted sulphuric acid* for half an hour; then strain through calico while hot.
b. After standing in a well-closed vessel for 24 hours, submit this paste to strong pressure, enveloped in a linen cloth; powder the pressed cake; again form a soft paste with *ether* mixed with $\frac{1}{16}$ its bulk of water; and press as before.	*b.* Collect the crystals that are deposited on cooling, and purify these with animal charcoal and repeated crystallization.
c. Evaporate the mixed expressed liquids, first spontaneously, and subsequently by the aid of a little heat, to the consistence of a soft extract; and dry on earthen plates or dishes, in a hot-air chamber under 212°.	

CHARACTERS AND TESTS.—These may also be presented in a tabular form, in order to indicate in what respects the two acids resemble and differ from each other.

TANNIC ACID.	GALLIC ACID.
a. In vesicular masses or thin scales.	*a.* Crystalline, in acicular prisms or silky needles.
b. Pale yellow colour; glistening.	*b.* Generally of pale fawn colour; sometimes nearly white.
c. Strongly astringent taste; and acid reaction.	*c.* Taste much less astringent.
d. Readily soluble in water and rectified spirit; very sparingly in ether.	*d.* Much less soluble in cold water (1 in 100); in boiling water (1 in 3); in rectified spirit (1 in 8).
e. The aqueous solution precipitates solution of gelatine yellowish-white, and the persalts of iron of a bluish-black colour.	*e.* The aqueous solution gives a bluish-black precipitate with persalts of iron, but no precipitate with gelatine.
f. Heated with free access of air, it partly melts, swells up, blackens, and finally burns away, leaving no residue.	*f.* The crystalline acid when dried at 212° loses 9·5 per cent. of its weight. It leaves no residue when burned with free access of air.

PHARMACY.—1. *Officinal Preparations:*—

The officinal preparations are chiefly made from *tannic acid*, there being only one of *gallic acid*. They may be arranged thus:—

a. Glycerinum { *Acidi Gallici* / *Acidi Tannici* }. Made respectively by stirring together in a porcelain dish { Gallic acid / Tannic acid }, ℥ 1, with Glycerine, fl ℥ 4, and applying a temperature not exceeding that of a water-bath until complete solution is effected.

b. Suppositoria Acidi Tannici. Made with oil of theobroma, each suppository containing gr. 3 of tannic acid.

c. Suppositoria Acidi Tannici cum Sapone. Made with glycerine of starch, curd soap, and starch. Each suppository contains gr. 3 of tannic acid.

d. Trochisci Acidi Tannici. Made with refined sugar, gum acacia, mucilage, and tincture of tolu. Each lozenge contains gr. ½ of tannic acid.

2. *Incompatibles.—a. Tannic acid.* Mineral acids; alkalies; salts of antimony, lead, and silver; persalts of iron; vegetable alkaloids; gelatine; and emulsions.

b. Gallic acid. Metallic salts; spirit of nitre.

ACTION.—Both gallic and tannic acids are powerful **astringents** and **styptics.** *Tannic acid* acts best locally; *gallic acid* is considered preferable as an internal astringent.

Dose—Of either Acid, gr. 2 to 10; Lozenges, 1 to 6.

2. **Acidum Benzoicum — Benzoic Acid.** — $HC_7H_5O_2$. An acid obtained from *Benzoin*, and prepared by sublimation. Not chemically pure.

CHARACTER AND TESTS.—*a.* Benzoic acid is in light, feathery, flexible, crystalline plates and needles, nearly colourless.

b. It has an agreeable aromatic odour, resembling that of benzoin.

c. Benzoic acid is sparingly soluble in water, but readily in rectified spirit; soluble also in solutions of the alkalies and of lime, forming benzoates, and it is precipitated from these by hydrochloric acid, unless the solution be very dilute.

d. It melts at 248°, boils at 462°, and then passes off in vapour, leaving only a slight residue.

PHARMACY.—1. *Officinal Preparation:—*

Trochisci Acidi Benzoici. Made with refined sugar, gum acacia, and mucilage. Each lozenge contains gr. ½ of benzoic acid.

2. *Benzoic acid* is used in the preparation of Ammoniæ Benzoas; and is also an ingredient in Tinctura Camphoræ Composita, and Tinctura Opii Ammoniata.

ACTION.—Locally benzoic acid has been used as an **antiseptic** and **germicide.** Internally administered, it is supposed to act on the general system as an **antiseptic** and **antipyretic.** In connection with the respiratory organs it is a **stimulant expectorant.** Upon the urinary apparatus it acts as a **diuretic;** and it also increases the acidity of the urine, in which it appears partly as hippuric acid.

Dose—Of Benzoic Acid, gr. 10 to 15; Lozenges, 1 to 5.

3. **Acidum Meconicum — Meconic Acid.** $H_3C_7HO_7$. An acid obtained from *Opium.*

CHARACTERS AND TESTS.—*a.* Meconic acid occurs in micaceous crystals, nearly colourless.

b. It is sparingly soluble in water, readily soluble in alcohol.

c. The solution in water has a strong acid taste and reaction.

d. This solution is coloured red by neutral solution of perchloride of iron, the colour being discharged by strong but not by diluted hydrochloric acid. It gives no precipitate with solution of iodine and iodide of potassium.

PHARMACY.—Meconic acid is merely introduced into the B.P. for the purpose of making *Liquor Morphinæ Bimeconatis.*

4. **Acidum Oleicum—Oleic Acid.** $HC_{18}H_{33}O_2$.

SOURCE AND PREPARATION.—A fluid fatty acid, obtained by the saponification of olein, or by the action of superheated steam on fats, with subsequent separa-

tion from solid fats by pressure. Usually not quite pure.

Characters and Tests.—*a.* Oleic acid is a straw-coloured liquid; of sp. gr. 0·860 to 0·890.

b. It is nearly tasteless and odourless, and with not more than a very faint reaction. Unduly exposed to the air, it becomes brown and decidedly acid.

c. It is insoluble in water, but readily soluble in alcohol, chloroform, and ether.

d. At 40° to 41° oleic acid becomes semi-solid, melting again at 56° to 60°.

e. It should be completely saponified when warmed with carbonate of potassium, and an aqueous solution of this salt neutralized by acetic acid, and treated with acetate of lead, should yield a precipitate which, after washing in boiling water, is almost entirely soluble in ether.

Pharmacy.—Oleic acid is only introduced into the B.P. for the purpose of making the Oleates of Mercury and Zinc.

5. Acidum Salicylicum — Salicylic Acid. $HC_7H_5O_3$.

Source and Preparation.—A crystalline acid obtained by the combination of the elements of carbolic acid with those of carbonic acid gas, and subsequent purification; or from natural salicylates, such as the oils of wintergreen (*Gaultheria procumbens*) and sweet birch (*Betula lenta*).

Characters and Tests.—*a.* Salicylic acid occurs in white acicular crystals.

b. It is inodorous, but light and easily diffused, and then irritating to the nostrils; taste at first sweetish, then acid.

c. It is soluble in 500 to 700 parts of water at ordinary temperatures; readily soluble in alcohol,

ether, and hot water; soluble also in solutions of citrate or acetate of ammonium, phosphate of sodium, or borax.

d. The crystals melt at about 311°, and below 392° volatilize without decomposition.

e. The aqueous solution gives with solution of perchloride of iron a reddish-violet colour. An alcoholic solution allowed to evaporate spontaneously should leave a perfectly white residue.

PHARMACY.—1. *Officinal Preparation:—*

Unguentum Acidi Salicylici.

Salicylic Acid, 1
Soft Paraffin, 18
Hard Paraffin, 9.

} Melt the paraffins, add the acid, and stir constantly until cold.

2. *Salicylic Acid* is used in making Sodii Salicylas.

ACTION.—Externally salicylic acid is an **antiseptic** and **disinfectant,** being extensively used in surgical practice; it is also a **local anhydrotic.** Internally it is chiefly employed as an **antipyretic,** and is looked upon almost as a specific in rheumatic fever; it is also given as an **antiseptic** and **antiperiodic.** Remotely it increases the acidity of the urine, and has hence been employed for its effect upon the urinary passages; it is liable to irritate the kidneys, and may cause albuminuria or hæmaturia. Salicylic acid is a **hepatic stimulant,** but tends to make the bile more watery, and has consequently been recommended as a remedy for gall-stones. In full doses this drug is liable to cause unpleasant or dangerous symptoms, such as headache, noises in the ears, deafness, and giddiness; or symptoms of depression of the cardiac and respiratory functions, which may come on suddenly, with collapse. It may produce a skin-eruption, like that of measles. The salicylate of sodium is generally given in preference to the acid.

Dose—gr. 5 to 30.

Group XVIII.—MISCELLANEOUS DRUGS.

There are a few officinal therapeutic agents derived from the vegetable kingdom, which cannot be classified under any of the foregoing groups, and these must be considered individually.

1. **Gossypium—Cotton Wool.**—The hairs of the seed of *Gossypium Barbadense* and other species, from which fatty matter and all foreign impurities have been removed. *N.O.* **Malvaceæ.**

Characters and Tests.—Cotton wool is in white soft filaments, each consisting of an elongated tubular cell, appearing under the microscope as a flattened twisted band, with slightly thickened rounded edges; inodorous and tasteless. It should readily be wetted by water, to which it should not communicate either an alkaline or acid reaction. On ignition in air it burns, leaving less than 1 per cent. of ash.

Pharmacy.—Cotton wool is in the B. P. for the purpose of making pyroxylin. It is a valuable **protective.**

2. **Pyroxylin.**—This substance is made by immersing Cotton Wool, ℥ 1, in { Sulphuric acid, fl ℥ 5 / Nitric acid, fl ℥ 5 }, in a porcelain mortar, and stirring for 3 minutes with a glass rod; washing with water, by repeated affusion, agitation, and decantation, until the washings give no precipitate with chloride of barium; draining the product on filtering paper; and drying in a water-bath.

Tests.—Pyroxylin is readily soluble in a mixture of ether and rectified spirit; it leaves no residue when exploded by heat.

Pharmacy.—Pyroxylin is introduced into the B.P. for the purpose of making Collodium, Collodium Flexile, and Collodium Vesicans.

3. { **Collodium—Collodion.**
   { **Collodium Flexile—Flexible Collodion.**

PREPARATION.—1. *Collodion* is prepared by adding Pyroxylin, ℥ 1, to { Ether, fl ℥ 36 / Rectified spirit, fl ℥ 12 }; setting aside for a few days; and decanting, if necessary.

2. *Flexible collodion* is a mixture of { Collodion, fl ℥ 12 / Canada Balsam, ℥ ½ / Castor Oil, ℥ ¼ }

CHARACTERS.—*a.* Both forms of collodion are colourless liquids; highly inflammable.

b. They have a strong ethereal odour.

c. They dry rapidly upon exposure to the air, and leave a thin transparent film, insoluble in water or rectified spirit. Collodion contracts in drying; flexible collodion does not contract.

ACTION.—Both forms of collodion are used as **protectives**; they are also slight **styptics.**

4. **Kamala—Wurrus.** A powder which consists of the minute glands and hairs obtained from the surface of the fruits of *Mallotus Philippinensis* (*Rottlera tinctoria*). *N.O.* **Euphorbiaceæ.**

CHARACTERS AND TESTS.—*a.* Kamala is a fine granular mobile powder, of a brick-red or madder colour.

b. It is nearly tasteless and inodorous.

c. Water has scarcely any effect on it, even at a boiling temperature, but it forms deep-red solutions with alcohol, ether, or chloroform.

d. Under the microscope it is seen to consist of irregular spherical flattened or depressed garnet-red glands with wavy surfaces, mixed with nearly colourless thick-walled stellate hairs.

e. On ignition in air it should yield 4 or 5, or at most 10 per cent. of ash.

ACTION.—Kamala is an **anthelmintic**, employed for tape-worm; it has the advantage of acting as a **purgative** at the same time.

Dose—gr. 30 to ʒ ¼.

5. **Pix Liquida—Tar.** A bituminous liquid, obtained from the wood of *Pinus sylvestris* and other species, by destructive distillation. *N.O.* **Coniferæ.**

CHARACTERS.—Tar is a dark-brown or blackish semi-liquid substance, of a well-known peculiar aromatic odour. Water agitated with it acquires a pale-brown colour, sharp empyreumatic taste, and acid reaction.

PHARMACY.—*Officinal Preparation:*—

Unguentum Picis Liquidæ. { Tar, 5
Yellow wax, 2.

Melt the wax at a low temperature, add the tar, and stir the mixture briskly while it cools.

ACTION.—Tar is chiefly used in the form of ointment, as a **stimulant** application in certain skin-diseases. It may be inhaled as a **stimulant expectorant.**

6. **Cerevisiæ Fermentum—Beer Yeast.** The ferment obtained in brewing beer, and produced by *Saccharomyces* (*Torula*) *Cerevisiæ.* It is a viscid, semi-fluid, frothy substance, exhibiting under the microscope numerous isolated roundish or oval cells, or short branched filaments composed of united cells; odour peculiar, taste bitter.

PHARMACY.—*Officinal Preparation:*—

Cataplasma Fermenti. { Beer yeast, fl ʒ 6
Wheaten flour, ʒ 14
Water at 100°, fl ʒ 6.

Mix the yeast with the water, and stir in the flour. Place the mass near the fire till it rises.

ACTION.—The poultice of yeast is **antiseptic** and **sedative.** Yeast itself has been administered internally as an **antiseptic.**

Dose—℥ ½ to 1.

7. **Mica Panis—Crumb of bread.** The soft part of bread made with wheaten flour. It is an ingredient in Cataplasma Carbonis.

8. **Amylum—Starch.** The starch procured from the grains of common wheat, *Triticum sativum* or *vulgare;* maize, *Zea Mays;* and rice, *Oryza sativa.*

CHARACTERS AND TESTS.—Starch occurs in fine powder, or in irregular angular or columnar masses, which are readily reduced to powder; white, inodorous. When rubbed with cold distilled water, the mixture is neutral in reaction, and the filtered liquid is not coloured blue with iodine. Mixed with boiling water and cooled, it gives a deep blue colour with iodine. Under the microscope the different forms of starch present characteristic appearances. (*See* B. P. p. 48.)

PHARMACY.—1. *Officinal Preparations:*—

a. Glycerinum Amyli.
- Starch, 1
- Glycerine, 5
- Distilled water, 3.

Stir together in a porcelain dish, and apply heat, stirring constantly until a translucent jelly is formed.

b. Mucilago Amyli.
- Starch, gr. 120
- Distilled water, fl ℥ 10.

Triturate the starch with the water, gradually added; then boil for a few minutes, constantly stirring.

2. *Starch* is used in making two of the Suppositories; and is contained in Pulvis Tragacanthæ Compositus.

Glycerine of starch is used in the preparation of three Suppositories.

Mucilage of starch is an ingredient in all the officinal Enemata except one (Asafœtida).

Action.—Starch is a **demulcent** and **emollient**. Internally it is **nutrient**.

9. { **Theriaca — Treacle.** The uncrystallized residue of the refining of sugar.
Saccharum Purificatum—Refined Sugar.
N.O. **Graminaceæ.**

Characters and Tests.—*Treacle* is a well-known thick, fermentable syrup, very sweet; not crystallizing by rest or spontaneous evaporation. Sp. gr. about 1·40. It is free from empyreumatic odour or flavour.

Refined sugar, or "lump sugar," is in conical loaves, compact, white, and crystalline. Readily and completely soluble in water, forming a clear bright syrup, which yields no red or yellowish precipitate, or scarcely a trace, on heating it to near the boiling point of water for a short time with a little solution of sulphate of copper and excess of solution of potash.

Pharmacy.—1. *Officinal Preparation:*—

Syrupus. { Refined sugar, lb 5
Distilled water, O 2.

Dissolve with the aid of heat, and after cooling add distilled water to make the weight = lb $7\frac{1}{2}$. Sp. gr. 1·330.

2. *Treacle* is used in the preparation of several Pills; and is an ingredient in Tinctura Chloroformi et Morphinæ. *Sugar* or *syrup* is an ingredient in many confections, lozenges, mixtures, pills, powders, syrups, and other preparations, being intended to give cohesion or consistence, to suspend substances, to preserve from chemical changes, or to act as a flavouring agent.

Action.—Treacle is an **aperient**. Sugar is **nutrient**, and **demulcent** in the form of syrup; it is chiefly used for its taste.

THE ANIMAL KINGDOM.

The therapeutic agents derived from the Animal kingdom may be conveniently discussed according to the following plan :—

I. Living Animal.

1. **Hirudo—The Leech.** Class, *Annelida.* The leech has a soft body, smooth, 2 or more inches long, tapering to each end, plano-convex, wrinkled transversely ; back olive-green, with 6 rusty-red longitudinal stripes. There are two varieties of leech, namely :—

(*a*) *Sanguisuga medicinalis*, the *speckled leech ;* which has a greenish-yellow belly, spotted with black.

(*b*) *S. officinalis*, the *green leech ;* in which the belly is olive-green and not spotted.

Leeches are collected in Spain, France, Italy, and Hungary. They are used for the local removal of blood, each drawing from 1 to 2 drachms.

II. Dead Insects.

1. **Cantharis—Cantharides.** The dried *Cantharis Vesicatoria*, *Blister Beetle*, or *Spanish Fly.* Order, *Coleoptera.* Chiefly collected in Russia, Sicily, and Hungary. These insects swarm on the trees about May or June, and are collected by shaking the branches, or brushing them off by masked persons, and catching them in linen cloths ; they are then killed by plunging them into boiling vinegar, and afterwards dried.

Characters.—*a.* Cantharides is from about $\frac{3}{4}$ to an inch long, and $\frac{1}{4}$ inch broad.

b. It has two long elytra or wing-sheaths, of a

shining coppery-green colour, under which are two thin, brownish, transparent, membranous wings.

c. The powder is greyish-brown, and contains shining green particles of the elytra.

d. The odour is peculiar, strong, and disagreeable; the taste burning.

COMPOSITION.—The chief constituents of cantharides are :—

a. Cantharidine, the active principle—a crystalline, volatile substance; chiefly soluble in ether, chloroform, and glacial acetic acid.

b. Oily and fatty principles.

c. Green and yellow colouring matters.

ADULTERATIONS AND IMPURITIES.—Cantharides is adulterated with coloured glass tubes and beads; and with the golden beetle. The powder should be free from mites as an impurity.

PHARMACY.—*Officinal Preparations :—*

a. Acetum Cantharidis.—Brown; sp. gr. about 1·060.

(i) Digest for two hours at 200°

- Cantharides, in powder, ℥ 2
- Glacial acetic acid, fl ℥ 2
- Acetic acid, fl ℥ 13.

(ii) Percolate when cold; pour acetic acid, fl ℥ 5, over the residuum; press and filter the product; mix the liquids; and add acetic acid to make O 1.

b. Charta Epispastica—Blistering paper.

(i) Digest in a water-bath for 2 hours, stirring constantly,

- White wax, ℥ 4
- Spermaceti, ℥ 1½
- Olive oil, fl ℥ 2
- Resin, ℥ ¾
- Cantharides, in powder, ℥ 1
- Distilled water, fl ℥ 6.

(ii) Strain, and separate the plaster from the watery fluid.

(iii) Melt the plaster in a shallow vessel, and mix with it Canada balsam, ℥ ¼.

(iv) Pass strips of paper over the surface of the hot liquid, so that one side of the paper shall receive a thin coating of plaster.

It may be convenient to employ paper ruled so as to indicate divisions, each of which is a square inch.

c. Emplastrum Cantharidis—Blistering plaster.

(i) Liquefy by a water-bath { Yellow wax, 2½ / Prepared suet, 2½ / Prepared lard, 2.

(ii) Add Resin, 1, previously melted.

(iii) Mix thoroughly Cantharides, in powder, 4, and continue to stir the mixture until it is cold.

d. Emplastrum Calefaciens—Warming plaster.

(i) Infuse for 6 hours { Cantharides, in coarse powder, ℥ 4 / Boiling water, O 1 }; squeeze strongly through calico; and evaporate by a water-bath to one-third.

(ii) Add { Expressed oil of nut meg, ℥ 4 / Yellow wax, ℥ 4 / Resin, ℥ 4 / Soap plaster, ℔ 2 / Resin plaster, ℔ 3 ¼. } Melt by a water-bath, and stir until thoroughly mixed.

e. Liquor Epispasticus—Blistering Liquid.

(i) Mix and pack in a percolator { Cantharides, in powder, ℥ 5 / Acetic ether, fl ℥ 3.

(ii) In 24 hours percolate slowly with acetic ether, until fl. ℥ 20 are obtained.

f. Collodium Vesicans—Blistering Collodion.

Dissolve by shaking in a stoppered bottle { Pyroxylin, ℥ 1 / Blistering liquid, fl ℥ 20.

g. Tinctura Cantharidis—Tincture of Cantharides.

Cantharides, in coarse powder, ℥ ¼ Proof spirit, O 1.	Macerate 7 days; strain, press, and filter; and make up to O 1.

h. Unguentum Cantharidis—Ointment of Cantharides.

(i) Infuse for 12 hours in a covered vessel,	Cantharides, ℥ 1 Olive oil, fl ℥ 6;	then place the vessel in boiling water for 15 minutes.

(ii) Strain through muslin with strong pressure; add the product to yellow wax, ℥ 1, previously melted; and stir constantly while the mixture cools.

Action.—Cantharides is chiefly employed externally, as an **irritant**, being either **rubefacient** or **vesicant**, according to the preparation used. Internally it acts as a **stimulant diuretic**, and **aphrodisiac**, but tends to cause dangerous irritation of the kidneys and genito-urinary mucous membrane; it may also produce an **emmenagogue** effect.

Dose.—Of Tincture, well-diluted, ♏ 5 to 20.

2. **Coccus — Cochineal.** The dried female insect, *Coccus Cacti.* Class *Hemiptera.* Reared on *Opuntia cochinillifera* and other species. Cochineal is brought from Mexico and Teneriffe. When the female insects are fecundated, they are swept off the trees, killed by immersion in boiling water, and dried.

Character and Tests.—Cochineal is about ⅛ inch long; somewhat oval in outline, flat or concave beneath, convex above; transversely wrinkled; purplish-black or purplish-grey; easily reduced to powder, which is dark-red or puce-coloured. When macerated in water no insoluble matter is separated. Ignited with free access of air, not much more than 1 per cent. remains.

Cochineal contains a colouring matter, known as *carmine*, which is a dibasic acid—*carminic acid.*

PHARMACY.—1. *Officinal Preparation :—*

Tinctura Cocci—Tincture of Cochineal.

Cochineal, in powder, ℥ 2½ Proof spirit, O 1.	Macerate 7 days ; stain, press, and filter ; and make up to O 1.

2. *Cochineal* is contained in Tinctura Cardamomi Composita, and Tinctura Cinchonæ Composita.

ACTION.—Cochineal is chiefly used as a colouring agent. It is supposed to act as a **pulmonary sedative** in whooping-cough.

III. PARTS OF ANIMALS, MODIFIED OR PREPARED.

1. **Adeps Præparatus—Prepared lard.** The purified internal fresh fat of the abdomen of the *Hog—Sus Scrofa.* Class, *Ungulata.* The B. P. gives directions for its preparation, but it can serve no useful purpose to describe them here.

CHARACTERS AND TESTS.—*a.* Lard is a white, soft, fatty substance, melting at about 100°.

b. It should not have a rancid odour.

c. It dissolves entirely in ether.

d. Distilled water, in which it has been boiled, when cooled and filtered, gives no precipitate with nitrate of silver, and is not rendered blue by the addition of solution of iodine. This shows the absence of salt and starch, used as adulterations.

PHARMACY.—1. *Officinal Preparation :—*

Adeps Benzoatus—Benzoated Lard. Melt prepared lard, 1 lb., by the heat of a water-bath ; add Benzoin,

gr. 140, reduced to coarse powder; continue the application of heat for two hours, frequently stirring; remove the residual benzoin by straining.

2. *Prepared lard* is contained in four Ointments, and in Emplastrum Cantharidis. *Benzoated lard* is used in the preparation of the larger majority of the officinal Ointments.

ACTION.—Lard is an **emollient** and **protective.**

2. **Sevum Præparatum—Prepared Suet.** The internal fat of the abdomen of the *sheep—Ovis Aries.* Class, *Ungulata*—purified by melting and straining. Suet is white, smooth, almost scentless; fusible at 103°. It is composed almost entirely of stearine, with a little oleine and palmitine, being the hardest of all the solid fats.

PHARMACY.—Prepared suet is contained in Emplastrum Cantharidis, and Unguentum Hydrargyri.

3. **Isinglass** is recognised in the *Appendix* of the B. P. This substance is the swimming-bladder or sound of various species of *Acipenser* (Sturgeon), prepared and cut into fine shreds. It consists of gelatine. A solution is employed as a test for tannic acid. It is nutritious and demulcent.

4. **Os Ustum—Bone ash.** This is the residue of bones which have been burned to a white ash in contact with air. It consists principally of phosphate of calcium, mixed with about 10 per cent. of carbonate of calcium, and a little fluoride of calcium, silica, and phosphate of magnesium.

PHARMACY.—*Bone Ash* is used in the preparation of Phosphate of Calcium, and Phosphate of Sodium.

IV. Secretions or their Constituents.

1. **Lac—Milk.** The fresh milk of the *Cow—Bos Taurus*. Class, *Ungulata*. It is only used in the B.P. for making Mistura Scammonii.

2. **Saccharum Lactis—Sugar of Milk.** A crystallized sugar—*Lactose*, obtained from the whey of milk by evaporation. It is usually in cylindrical masses, 2 inches in diameter, with a cord or stick in the axis; or in fragments of cakes; greyish-white and translucent; crystalline on the surface and in its texture; hard, and gritty when chewed; faintly sweet; scentless. Soluble in about seven parts of water at common temperatures, and in about one part of boiling water.

Pharmacy.—Sugar of milk is introduced into the B.P. for the purpose of conveniently dividing the dose of elaterinum in Pulvis Elaterini Compositus.

3. **Mel—Honey.** A saccharine secretion deposited in the honeycomb by the *Hive bee—Apis mellifica*. Class, *Hymenoptera*. Its characters are so well known, that they need no description. It is liable to be adulterated with starch, which is detected by water with which it has been boiled for five minutes, and allowed to cool, becoming blue with solution of iodine. Incinerated, it should not yield more than 0·2 per cent. of ash, the solution of which in water acidulated with nitric acid should not afford more than a slight turbidity with solution of chloride of barium.

Pharmacy.—1. *Officinal Preparations:—*

a. Mel depuratum—Clarified honey. Prepared by melting in a water-bath, and straining, while hot, through flannel, previously moistened with warm water.

b. Oxymel.

Clarified honey, ℥ 40 Acetic acid, fl ℥ 5 Distilled water, fl ℥ 5.	Liquefy the honey by heat, and mix with the acid and water.

Dose—fl ʒ 1 to 2.

2 *Clarified honey* is contained in three Confections, Mel Boracis, and Oxymel Scillæ.

Action.—Honey may be used locally as an **emollient**. Internally it is a flavouring agent, **laxative**, and **nutrient**.

4. **Cera Flava et Alba—Yellow and White Wax.** The honeycomb melted in boiling water and cooled constitutes *yellow wax*. When this is bleached by exposing it to moisture, air, and light, it forms *white wax*. The appearances of these two forms of wax are sufficiently familiar. They should not be unctuous to the touch. They should be readily and entirely soluble in hot oil of turpentine; but should not yield more than 3 per cent. to cold rectified spirit, and nothing to water or to a boiling solution of soda. They are liable to be adulterated with lard, suet, tallow, resin, and starch.

Pharmacy.—*Yellow wax* is used as an ingredient in several Ointments and Plasters, and in Pilula Phosphori. The ointments keep for a longer time without becoming rancid, than if made with white wax. (Squire.)

White wax is an ingredient in Unguentum Cetacei, Unguentum Simplex, and Charta Epispastica.

Unguentum Simplex.

White wax, ℥ 2 Benzoated lard, ℥ 3 Almond oil, fl ℥ 3.	Melt together in a water-bath, remove the mixture, and stir constantly while it cools.

ACTION.—Wax is an **emollient.** It is chiefly employed to give consistence to ointments.

5. **Cetaceum—Spermaceti.** A concrete fatty substance, obtained, mixed with oil, from the head of the *Physeter Macrocephalus*, or *Sperm Whale*, belonging to the *Cetacea.* It is separated from the oil by filtration and pressure, and afterwards purified. It consists of nearly pure *Cetine* or *palmitate of cetyl.*

CHARACTERS AND TESTS.—*a.* Spermaceti is a crystalline substance, scarcely unctuous to the touch.

b. It is pearly-white, glistening, translucent.

c. It has but little taste or odour.

d. It is reducible to powder by the addition of a little rectified spirit.

e. Melting-point 111° to 122°.

f. Insoluble in water; soluble in ether, chloroform, and boiling rectified spirit.

PHARMACY—1. *Officinal Preparation:—*

Unguentum Cetacei.

Melt together { Spermaceti, ℥ 5; White wax, ℥ 2; Almond oil, O 1 }; add Benzoin, in coarse powder, ℥ ½, and continue the heat for 2 hours, frequently stirring; strain the residual benzoin, and stir constantly until cold.

2. *Spermaceti* is contained in Charta Epispastica.

ACTION.—Spermaceti is an **emollient** and **demulcent.** It is chiefly used externally.

6. **Pepsin.** A preparation of the mucous lining of the fresh and healthy stomach of the pig, sheep, or calf. It is made by cleansing the mucous membrane; scraping it with a blunt knife or other suitable in-

strument; and quickly drying the viscid pulp thus obtained under 100°, spread over the surface of glass or glazed earthenware. Pepsin thus prepared is a light yellowish-brown powder; with a faint, but not disagreeable odour, and slightly saline taste. Very little soluble in water or spirit. Two grains with { Distilled water, fl ʒ 1 / Hydrochloric acid, ♏ 5 } will dissolve at least 100 grains of hard-boiled white of egg, passed through wire gauze of a certain mesh, when well mixed, digested, and well stirred together for 30 minutes at 130°.

ACTION.—Pepsin is a **digestant.**

Dose—gr. 2 to 5.

7. **Fel Bovinum Purificatum—Purified Ox-bile.** The purified gall of the *Ox—Bos Taurus.* It is prepared by evaporating fresh ox-bile, mixing with rectified spirit, decanting and filtering, distilling off most of the spirit, and evaporating by the heat of a water-bath to a pilular consistence.

Ox-gall is a yellowish-green substance; with a sweet and bitter taste; soluble in water and spirit. Its watery solution gives no precipitate on adding rectified spirit.

ACTION.—Ox-gall is a substitute for bile, and acts as an **aperient.**

Dose—gr. 5 to 10.

8. **Moschus—Musk.** The dried secretion from the preputial follicles of the *Moschus moschiferus*, the *Musk Deer*, belonging to *Ungulata.* Each sac yields from 103 to 200 grains. There are two varieties of musk imported, namely, China or Thibet, which is the better, and Russian or Siberian. It is in the

form of somewhat unctuous, irregular grains; of a dark reddish-brown or reddish-black colour; with a strong, peculiar, diffusible, penetrating, and persistent odour; and a bitterish taste. It is contained in a roundish or oval sac, from about 1½ to 2 inches in diameter, nearly smooth on one side, and covered on the other or outer side by brownish-yellow or greyish adpressed bristle-like hairs concentrically arranged around a nearly central orifice. Musk is soluble in water and alcohol. It consists of a peculiar odorous principle, volatile oil, ammonia, cholesterine, stearine, oleine, albumen, and salts. It should be free from earthy impurities.

ACTION.—Musk is a **stimulant** and **anti-spasmodic.**

Dose—gr. 5 to 10.

V. PREPARATION FROM AN ORGAN.

1. **Oleum Morrhuæ—Cod-liver oil.** The oil extracted from the fresh liver of *Gadus Morrhua*, the *Cod.* Class, *Pisces.* It is obtained by the application of a heat not exceeding 180°. Cod-liver oil contains glycerine, oleic, margaric, butyric, and acetic acids; *gaduin*, a peculiar substance; biliary principles; a small quantity of iodine, with traces of bromine, chlorine, phosphorus, and salts. The best oil is pale-yellow, with a slight fishy odour, and bland fishy taste.

ACTION.—Cod-liver oil is a valuable **nutrient,** and thus indirectly becomes a **tonic** and **hæmatinic;** it is also an **alterative** in certain conditions.

Dose—fl ʒ 1 to 8.

VI. Ovum—Egg.

The *egg* of *Gallus Bandiva*, the *Common Fowl.* Class, *Aves.* Is officinal in the following forms :—

1. **Ovi Albumen—Egg Albumen.** The liquid white of the egg.

2. **Ovi Vitellus — Yolk of egg,** which is an ingredient in Mistura Spiritus Vini Gallici.

Action.—White of egg may be used as a **demulcent.** Internally eggs are **nutrient.**

Section IV.

SUMMARY OF OFFICINAL PREPARATIONS.

The officinal preparations of the B.P. have already been considered as regards :—1. Their general nature, and the methods of preparing the several groups. 2. The preparations of particular drugs. In the present section it is intended to give a summary of the members belonging to each group, also indicating the proportions of their important ingredients, where this is needed; and the doses of the preparations used for internal administration.

I. Aceta—Vinegars.

1. Acetum—Vinegar. *Dose*—fl ʒ 1 to fl ℥ 1.
2. ,, Cantharidis (for external use).
3. ,, Scillæ. *Dose*—♏ 15 to 40.

II. Aquæ—Waters.

1. Aqua Destillata—Distilled water.
2. Solutions in water. { *a*. Aqua Chloroformi } *Dose* fl ℥ ½ to 2. { *b*. ,, Camphoræ } ,, fl ℥ 1 to 2.
3. Waters containing volatile oils, and prepared by distillation. (*See* Volatile Oils.)

III. Cataplasmata—Poultices.

1. Simple { *a*. Cataplasma Fermenti. { *b*. ,, Lini.

2. Containing special ingredients.
- *a.* Cataplasma Carbonis.
- *b.* „ Conii.
- *c.* „ Sinapis.
- *d.* „ Sodæ Chlorinatæ.

IV. Chartæ—Papers.

1. Charta Epispastica—Blistering paper.
2. „ Sinapis—Mustard paper.

V. Confectiones—Confections.

1. Simple. (Used for making up pills.)
- *a.* Confectio Rosæ Caninæ.
- *b.* „ „ Gallicæ.

2. Containing active ingredients.

		Dose.
a.	Confectio Opii = 1 in 40 nearly . .	gr. 5–20.
b.	Confectio Piperis .	gr. 60–120.
c.	„ Scammonii .	gr. 10–30.
d.	„ Sennæ .	gr. 60–120.
e.	„ Sulphuris .	gr. 60–120.
f.	„ Terebinthinæ	gr. 60–120.

VI. Decocta—Decoctions.

1. Simple Decoctions.

			Dose.
a.	Decoctum Cetrariæ .	fl ℥	1–4.
b.	„ Cinchonæ .	fl ʒ	1–2.
c.	„ Granati Radicis	fl ℥	2–4.
d.	„ Hæmatoxyli .	fl ℥	1–2.
e.	„ Hordei . .	fl ℥	1–4.
f.	„ Papaveris (for external use).		
g.	„ Pareiræ . .	fl ℥	1–2.
h.	„ Quercus (for external use).		
i.	„ Sarsæ . .	fl ℥	2–10.
j.	„ Scoparii . .	fl ℥	2–4.
k.	„ Taraxaci .	fl ℥	2–4.

			Dose.
2. Compound Decoctions.	*a.*	Decoctum Aloes Comp..	fl ℥ ½–2.
	b.	„ Sarsæ Comp..	fl ℥ 2–10.

VII. Emplastra—Plasters.

1. Simple plasters, used for protection or support.	*a.*	Emplastrum Ferri.	
	b.	„	Plumbi.
	c.	„	Resinæ.
	d.	„	Saponis.
	e.	„	Saponis Fuscum.
2. Stimulant and alterative plasters.	*a.*	Emplastrum Ammoniaci cum Hydrargyro.	
	b.	„	Galbani.
	c.	„	Hydrargyri.
	d.	„	Picis.
	e.	„	Plumbi Iodidi.
3. Rubefacient or vesicant plasters.	*a.*	Emplastrum Calefaciens.	
	b.	„	Cantharidis.
4. Anodyne or sedative plasters.	*a.*	Emplastrum Belladonnæ.	
	b.	„	Opii.

VIII. Enemata—Clysters.

1. Enema Aloes = gr. 40 in fl ℥ 10.
2. „ Asafœtidæ = gr. 30 in fl ℥ 4 of *cold water*.
3. „ Magnesii Sulphatis = ℥ 1 in fl ℥ 15 of Mucilage of Starch, with Olive Oil, fl ℥ 1.
4. „ Opii = fl ʒ ½ of Tincture of Opium, with fl. ℥ 2 of Mucilage of Starch.
5. „ Terebinthinæ = fl ℥ 1 with fl ℥ 15 of Mucilage of Starch.

IX. Essentiæ—Essences.

1. Essentia Anisi. 2. „ Menthæ Piperitæ.	Solutions of *Volatile Oil* in *Rectified Spirit* = 1 in 4. *Dose*—♏ 10 to 20.

X. Extracta—Extracts.

A. Green Extracts.

		Dose.
1. From fresh leaves and flowering tops.	Extractum Aconiti	gr. ¼–1
2. From fresh leaves and young branches.	*a.* Extractum Belladonnæ	gr. ¼–1
	b. „ Conii	gr. 2–6
	c. „ Hyoscyami	gr. 5–10
	(Flowering tops of Hyoscyamus also used.)	
3. From flowering herb.	Extractum Lactucæ	gr. 5–15
4. From fresh corm.	*a.* Extractum Colchici *b.* „ „ Aceticum	gr. ½–2
5. From root	Extractum Taraxaci	gr. 5–30

B. Aqueous Extracts.

1. Digested in boiling water.	*a.* Extractum Aloes Barbadensis	gr. 2–6
	b. „ Aloes Socotrinæ	gr. 2–6
	c. „ Pareiræ	gr. 10–30

			Dose.
2. Infused in boiling water, and then boiled.	*a.*	Extractum Gentianæ .	gr. 2–10
	b.	„ Hæmatoxyli	gr. 10–30
3. Boiled, and volatile oil added.		Extractum Anthemidis .	gr. 2–10
4. Macerated in cold water.	*a.*	Extractum Glycyrrhizæ	3 ½–1
	b.	„ Krameriæ . (also percolated)	gr. 5–20
	c.	„ Opii .	gr. ½–2
	d.	„ Quassiæ .	gr. 3–5

C. Alcoholic Extracts.

1. Prepared with rectified spirit.	*a.*	Extractum Cannabis Indicæ	gr. ¼–1
	b.	„ Physostigmatis .	gr. $\frac{1}{16}$–¼
2. Prepared with rectified spirit and water.	*a.*	Extractum Belladonnæ Alcoholicum .	gr. $\frac{1}{16}$–¼
	b.	„ Gelsemii Alcoholicum .	gr. ½–2
	c.	„ Jalapæ . .	gr. 5–15
	d.	„ Lupuli . .	gr. 5–15
	e.	„ Nucis Vomicæ .	gr. ¼–1
	f.	„ Papaveris .	gr. 2–5
		(Boiling water used.)	
3. Prepared with proof spirit.	*a.*	Extractum Calumbæ .	gr. 2–10
	b.	„ Colocynthidis Compositum	gr. 3–10

		Dose.
4. Prepared with proof spirit and water.	*a.* Extractum Cascaræ Sagradæ	gr. 2–8
	b. „ Jaborandi .	gr. 2–10
	c. „ Rhamni Frangulæ . .	gr. 15–60
	d. „ Rhei . .	gr. 5–15
	e. „ Stramonii. (Oil previously removed by washed ether) . .	gr. $\frac{1}{4}$–$\frac{1}{2}$

D. Ethereal Extracts.

1. Extractum Filicis Liquidum . . ♏ 15–30
2. „ Mezerei Æthereum (made with rectified spirit and ether).

E. Liquid Extracts.

1. *Made with water and rectified spirit.*
   - *a.* Extractum Belæ Liquidum . fl ʒ $\frac{1}{2}$–2
   - *b.* „ Cascaræ Sagradæ Liquidum . . . . fl ʒ $\frac{1}{2}$–2
   - *c.* Extractum Cinchonæ Liquidum (Hydrochloric Acid and Glycerine also used) . . . ♏ 5–10
   - *d.* Extractum Ergotæ Liquidum . ♏ 10–30
   - *e.* „ Glycyrrhizæ Liquidum fl ʒ 1
   - *f.* Extractum Opii Liquidum. (Made from the Extract) . . . ♏ 10–40
   - *g.* Extractum Pareiræ Liquidum. (Made from the Extract) . . fl ʒ $\frac{1}{2}$–2
   - *h.* Extractum Rhamni Frangulæ Liquidum . . . . fl ʒ 1–4
2. *Made with rectified spirit.*
   Extractum Cimicifugæ Liquidum . ♏ 3–30
3. *Made with proof spirit.*
   Extractum Cocæ Liquidum . . fl ʒ $\frac{1}{2}$–2

	Dose.
4. *Made with proof spirit and water.*	
a. Extractum Sarsæ Liquidum .	fl ʒ 2–4
b. ,, Taraxaci Liquidum .	fl ʒ ¼–2
5. *Made with ether.*	
Extractum Filicis Liquidum.	
(*See* ETHEREAL EXTRACTS.)	

XI. GLYCERINA—GLYCERINES.

1.	Glycerinum Acidi Carbolici	1 in 4
2.	,, ,, Gallici	
3.	,, ,, Tannici	
4.	,, Alumini . .	1 in 5
5.	,, Amyli . .	1 in 8
6.	,, Boracis . .	1 in 6
7.	,, Plumbi Subacetatis	
8.	,, Tragacanthæ .	3 in 14

XII. INFUSA—INFUSIONS.

A. SIMPLE INFUSIONS.

℥ 1 in fl ʒ 10	Infusum Cascarillæ . .	fl ʒ 1–2
	,, Sennæ. (Contains Ginger, gr. 28) .	fl ʒ 1–2
℥ ½ in fl ʒ 10	Infusum Anthemidis . .	fl ʒ 1–4
	,, Aurantii . . .	fl ʒ 1–2
	,, Buchu . . .	fl ʒ 1–4
	,, Calumbæ (cold water)	fl ʒ 1–2
	,, Cinchonæ Acidum. (Contains Aromatic Sulphuric Acid, fl ʒ 1.)	fl ʒ 1–2
	,, Cuspariæ (water at 120°)	fl ʒ 1–2
	,, Jaborandi . .	fl ʒ 1–2
	,, Krameriæ . .	fl ʒ 1–2
	,, Lupuli . . .	fl ʒ 1–2
	,, Maticæ . . .	fl ʒ 1–4
	,, Senegæ . . .	fl ʒ 1–2
	,, Uvæ Ursi. . .	fl ʒ 1–2

		Dose.
℥ ½ in fl ℥ 8	Infusum Cusso . . .	fl ℥ 4–8
gr. 160 in fl ℥ 10	Infusum Catechu. (Contains Cinnamon, gr. 30) .	fl ℥ 1–2
gr. 150 in fl ℥ 10	Infusum Lini. (Contains Liquorice, gr. 50) . .	fl ℥ 2–4
℥ ¼ in fl ℥ 10	Infusum Caryophylli . .	fl ℥ 1–4
	,, Chiratæ (water at 120)	fl ℥ 1–2
	,, Ergotæ . . .	fl ℥ 1–2
	,, Rhei	fl ℥ 1–2
	,, Rosæ Acidum. (Contains Diluted Sulphuric Acid, fl. ʒ 1).	fl ℥ 1–2
	,, Serpentariæ . .	fl ℥ 1–2
	,, Valerianæ. . .	fl ℥ 1–2
gr. 55 in fl ℥ 10	Infusum Quassiæ (cold water) .	fl ℥ 1–2
gr. 28 in fl ℥ 10	Infusum Digitalis . .	fl ʒ 2–4

B. Compound Infusions.

Infusum Aurantii Compositum ,, Gentianæ ,,	. .	fl ℥ 1–2

XIII. Injectiones—Injections.

1. Injectio Apomorphinæ Hypodermica = gr. 2 in ♏ 100	♏ 2–8
2. Injectio Ergotini Hypodermica = 1 in 2	♏ 3–10
3. Injectio Morphinæ Hypodermica = gr. 1 of Acetate of Morphine in ♏ 10 .	♏ 1–5

XIV. Lamellæ—Discs.

1. Lamellæ Atropinæ = gr. $\frac{1}{3000}$ of Sulphate of Atropine.

2. Lamellæ Cocainæ = gr. $\frac{1}{200}$ of Hydrochlorate of Cocaine.

3. Lamellæ Physostigminæ = gr. $\frac{1}{1000}$ of Physostigmine.

XV. Linimenta—Embrocations.

1. Mixtures with or solutions in Olive Oil.
   - *a.* Linimentum Ammoniæ. (1 of Solution of Ammonia to 3.)
   - *b.* Linimentum Calcis. (An equal proportion of Solution of Lime.)
   - *c.* Linimentum Camphoræ = 1 to 4.

2. Mixtures with or solutions in Liniment of Camphor.
   - *a.* Linimentum Chloroformi. (Equal parts.)
   - *b.* Linimentum Terebinthinæ Aceticum. (Four parts of Oil of Turpentine and Liniment of Camphor, with 1 part of Glacial Acetic Acid.)
   - *c.* Linimentum Hydrargyri. (Equal parts of Ointment of Mercury, Solution of Ammonia, and Camphor Liniment.)

3. Prepared by maceration and percolation with Rectified Spirit, Camphor being then added.
   - *a.* Linimentum Aconiti.
   - *b.* „ Belladonnæ.

4. Special liniments, of more or less complex composition.
- *a.* Linimentum Camphoræ Compositum.
- *b.* ,, Crotonis.
- *c.* ,, Iodi.
- *d.* ,, Potassii Iodidi cum Sapone.
- *e.* ,, Saponis.
- *f.* ,, Sinapis Compositum.
- *g.* ,, Terebinthinæ.

5. Mixture with Liniment of Soap.
- *a.* Linimentum Opii. (An equal proportion of Tincture of Opium.)

XVI. Liquores—Solutions.

This is a very large group of pharmaceutical preparations, and one difficult to classify. The following arrangement may be found practically useful, both for remembering them and for reference.

1. Liquor Iodi = gr. 22 in fl ℥ 1. (Contains Iodide of Potassium, gr. 33.)

2. Solutions of or yielding free Chlorine.
- *a.* Liquor Chlori = gr. 2·66 in fl. ℥ 1.
- *b.* ,, Calcis Chlorinatæ = about 2 per cent. of free Chlorine.
- *c.* ,, Sodæ Chlorinatæ = about $2\frac{1}{2}$ per cent of available Chlorine.

Dose.

3. Solutions of Alkalies and Alkaline Earths.
- *a.* Liquor Ammoniæ Fortior = gr. 15·83 of NH_3 gas in fl 3 1.
- *b.* Liquor Ammoniæ = gr. 5·2 of NH_3 gas in fl 3 1.
- *c.* Liquor Potassæ = gr. 27 of Hydrate of Potassium in fl ℥ 1 . . . . ♏ 15–60

		Dose.
3. Solutions of Alkalies and Alkaline Earths. (*continued*)	*d.* Liquor Sodæ = gr. 18·8 of Hydrate of Sodium in fl ʒ 1.	
	e. Liquor Calcis = gr. ½ of Lime in fl. ʒ 1 . . .	ʒ ½–4
	f. Liquor Calcis Saccharatæ = gr. 7·11 of Lime in ʒ 1 .	♏ 15–60
4. Solutions of Carbonates, Acetates, and Citrates of Alkalies and Alkaline Earths.	*a.* Liquor Ammonii Acetatis Fortior . . .	♏ 25–75
	b. Liquor Ammonii Acetatis.	fl ʒ 2–6
	c. „ Ammonii Citratis Fortior . . .	fl ʒ ½–1½
	d. Liquor Ammonii Citratis .	fl ʒ 2–6
	e. „ Lithiæ Effervescens	fl ʒ 5–10
	f. „ Potassæ „	
	g. „ Sodæ „	
	h. „ Magnesii Carbonatis	fl ʒ 1–2
	i. „ „ Citratis .	fl ʒ 5–10
5. Solutions containing preparations of Arsenium.	*a.* Liquor Arsenicalis *b.* Liquor Arsenici Hydrochloricus = 1 per cent. of Arsenious Acid	♏ 2–8
	c. Liquor Arsenii et Hydrargyri Iodidi = about 1 per cent. by weight of Arsenious Iodide, and of Mercuric Iodide. . .	♏ 10–30
	d. Liquor Sodii Arseniatis = 1 per cent. of Arseniate of Sodium . . .	♏ 5–10
6. Solutions containing preparations of Iron.	*a.* Liquor Ferri Dialysatus .	♏ 10–30
	b. „ „ Acetatis Fortior . . .	♏ 1–8
	c. Liquor Ferri Acetatis .	♏ 5–30
	d. „ „ Perchloridi Fortior.	
	e. Liquor Ferri Perchloridi .	♏ 10–30
	f. „ „ Pernitratis .	♏ 10–40
	g. „ „ Persulphatis.	

		Dose.
7. Solutions of Salts of Mercury.	*a.* Liquor Hydrargyri Nitratis Acidus.	
	b. Liquor Hydrargyri Perchloridi = gr. ½ in fl. ℥ 1, with Ammonium Chloride	fl ʒ ½–2
	c. Liquor Arsenii et Hydrargyri Iodidi. (*See* ARSENIUM.)	
8. Solutions containing Lead.	*a.* Liquor Plumbi Subacetatis.	
	b. ,, ,, ,, Dilutus.	
9. Miscellaneous solutions of Inorganic Compounds.	*a.* Liquor Acidi Chromici.	
	b. ,, Antimonii Chloridi.	
	c. ,, Bismuthi et Ammonii Citratis. *Dose*—fl ʒ ½–1.	
	d. Liquor Calcii Chloridi.	
	e. ,, Potassii Permanganatis = 1 per cent. *Dose*—fl ʒ 1–2.	
	f. Liquor Sodii Ethylatis.	
	g. ,, Zinci Chloridi.	
10. Solutions of Alkaloids or their salts. Usual strength = 1 per cent.	*a.* Liquor Atropinæ Sulphatis	♏ 1–4
	b. ,, Morphinæ Acetatis	♏ 10–60
	c. ,, Morphinæ Bimeconatis = about 1¼ per cent.	♏ 5–40
	d. ,, Morphinæ Hydrochloratis	♏ 10–60
	e. ,, Strychninæ Hydrochloratis	♏ 5–10
11. Special solutions.	*a.* Liquor Epispasticus.	
	b. ,, Gutta percha.	

XVII. LOTIONES—LOTIONS.

1. Lotio Hydrargyri Flava (Yellow wash).
2. ,, Hydrargyri Nigra (Black Wash).

XVIII. Mellita—Honeys.

1. Mel Depuratum—Purified honey.
2. Mel Boracis.

XIX. Misturæ—Mixtures.

	Dose.
Mistura Ammoniaci	fl ℥ ½–1
„ Amygdalæ	fl ℥ 1–2
„ Creasoti	fl ℥ 1–2
„ Cretæ	fl ℥ 1–2
„ Ferri Aromatica . . .	fl ℥ 1–2
„ Ferri Composita . . .	fl ℥ 1–2
„ Guaiaci	fl ℥ ½–2
„ Scammonii	fl ℥ 1–3
„ Sennæ Composita . . .	fl ℥ 1–1½
„ Spiritus Vini Gallici . . .	fl ℥ 1–2

XX. Mucilagines—Mucilages.

1. Mucilago Acaciæ. Used in making lozenges.
2. „ Amyli. Used in enemata.
3. „ Tragacanthæ.

XXI. Olea—Oils.

These preparations have been already fully discussed, and it will suffice here to sum them up in the following way:—

1. Oils from the Vegetable Kingdom.
2. Cod-liver oil.

3. Oleum Phosphoratum. A solution of phosphorus in almond oil = about 1 per cent. of Phosphorus.

Dose—m 5–10.

XXII. Oleata—Oleates.

1. Oleatum Hydrargyri.
2. ,, Zinci.

XXIII. Oxymellita—Oxymels.

	Dose.
1. Oxymel	fl ʒ 1–2
2. ,, Scillæ	fl ʒ ½–1

XXIV. Pilulæ—Pills.

These preparations may be arranged thus :—

1. Aperient or Purgative Pills. All contain *Aloes*, except the last in the list.	*a.*	Pilula Aloes Barbadensis	gr. 5–10
	b.	,, Aloes Socotrinæ	
	c.	,, Aloes et Asafœtidæ	
	d.	,, Aloes et Ferri	
	e.	,, Aloes et Myrrhæ	
	f.	,, Cambogiæ Composita	
	g.	,, Colocynthidis Composita	
	h.	,, Colocynthidis et Hyoscyami	
	i.	,, Rhei Composita	
	j.	,, Scammonii Composita	

		Dose.
2. Pills containing Iron salts.	*a.* Pilula Ferri Carbonatis .	gr. 5–20
	b. „ Ferri Iodidi . .	gr. 3–8
3. Pills containing Mercury.	*a.* Pilula Hydrargyri . .	gr. 3–8
	b. „ „ Subchloridi Composita . .	gr. 5–10
4. Pills containing Opium, either alone or combined with other ingredients.	*a.* Pilula Ipecacuanhæ cum Scilla. (Made with Dover's Powder.) . . .	gr. 5–10
	b. Pilula Plumbi cum Opio .	gr. 3–5
	c. „ Saponis Composita .	gr. 3–5
	(Opium is the only active ingredient = about gr. 1 in 6.)	
5. Miscellaneous group.	*a.* Pilula Asafœtidæ Composita . . .	gr. 5–10
	b. „ Conii Composita .	gr. 5–10
	c. „ Phosphori . .	gr. 2–4
	d. „ Scillæ Composita .	gr. 5–15

XXV. Pulveres—Powders.

These preparations must be studied individually, but for mere reference they may be grouped thus :—

		Dose.
1. Inactive powders, chiefly used for pharmaceutical purposes.	*a.* Pulvis Amygdalæ Compositus . . .	
	b. Pulvis Cinnamomi Compositus . . .	gr. 3–10
	c. Pulvis Tragacanthæ Compositus . . .	gr. 20–60
2. Powder containing Antimony	*a.* Pulvis Antimonialis. (Contains Oxide of Antimony = 1 in 3) . . .	gr. 3–5

		Dose.
3. Mild astringent powders.	*a.* Pulvis Catechu Compositus	gr. 20–40
	b. Pulvis Cretæ Aromaticus	gr. 10–60
4. Powders containing Opium.	*a.* Pulvis Cretæ Aromaticus cum Opio = 1 in 40	gr. 10–40
	b. Pulvis Kino Compositus = 1 in 20	gr. 5–20
	c. Pulvis Ipecacuanhæ Compositus = 1 in 10	gr. 5–15
	d. Pulvis Opii Compositus = 1 in 10	gr. 2–5
5. Purgative or aperient powders.	*a.* Pulvis Elaterini Compositus = 1 in 40	gr. $\frac{1}{2}$–5
	b. Pulvis Glycyrrhizæ Compositus. (Contains Senna and Sulphur)	gr. 30–60
	c. Pulvis Jalapæ Compositus. (Contains Acid Tartrate of Potassium)	gr. 20–60
	d. Pulvis Rhei Compositus	gr. 20–60
	e. „ Scammonii Compositus	gr. 10–20

XXVI. Spiritus—Spirits.

1. Alcoholic group.	*a.* Spiritus Rectificatus.	
	b. „ Tenuior.	
	c. „ Vini Gallici.	
2. Ether and chloroform group.	*a.* Spiritus Ætheris	♏ 30–90
	b. „ „ Compositus	fl $3\frac{1}{2}$–2
	c. „ „ Nitrosi	fl $3\frac{1}{2}$–2
	d. „ Chloroformi	♏ 20–60
3. Ammonia group.	*a.* Spiritus Ammoniæ Aromaticus	fl 3 $\frac{1}{2}$–1
	b. Spiritus Ammoniæ Fœtidus	fl 3 $\frac{1}{2}$–1

		Dose.
4. Solutions of Volatile oils in Rectified Spirit = 1 to 49.	*a.* Spiritus Cajuputi *b.* „ Cinnamomi *c.* „ Juniperi *d.* „ Lavandulæ *e.* „ Menthæ Piperitæ *f.* „ Myristicæ *g.* „ Rosmarini	fl 3 ½–1
5. Miscellaneous group.	*a.* Spiritus Armoraciæ Compositus . .	fl 3 1–2
	b. Spiritus Camphoræ .	♏ 10–30

XXVII. Succi—Juices.

1. Fresh expressed juices of ripe fruits.	*a.* Limonis Succus *b.* Mori „	
2. Expressed juices preserved with Rectified Spirit.	*a.* Succus Belladonnæ .	♏ 5–15
	b. „ Conii . .	fl 3 ½–1
	c. „ Hyoscyami .	fl 3 ½–1
	d. „ Scoparii . .	fl 3 1–2
	e. „ Taraxaci . .	fl 3 1–2

XXVIII. Suppositoria—Suppositories.

1. Suppositoria Acidi Carbolici cum Sapone = gr. 1.
2. „ „ Tannici } = gr. 3
3. „ „ „ cum Sapone }
4. „ Hydrargyri = gr. 5 of Unguentum Hydrargyri
5. Suppositoria Iodoformi = gr. 3.
6. „ Morphinæ } = gr. ½ of Hydrochlorate.
7. „ „ cum Sapone }
8. „ Plumbi Composita { Acetate of Lead, gr. 3
Opium, gr. 1

XXIX. Syrupi—Syrups.

		Dose.
1. Syrupus—Solution of refined sugar.		
2. Mixtures with or solutions in Syrup.	*a.* Syrupus Aurantii = 1 of Tincture in 8 . .	fl 3 1
	b. Syrupus Chloral = gr. 10 in 3 1 . . .	fl 3 ½–2
	c. Syrupus Zingiberis = 1 of Strong Tincture in 25	fl 3 1–2
3. Syrups made from juices of fruits.	*a.* Syrupus Limonis (with Lemon Peel).	fl 3 1
	b. Syrupus Mori.	
4. Syrups made from parts of plants.	*a.* Syrupus Hemidesmi .	fl 3 1
	b. ,, Papaveris .	fl 3 1
	c. ,, Rhei . .	fl 3 1–4
	d. ,, Rhœados .	fl 3 1
	e. ,, Rosæ Gallicæ .	fl 3 1
	f. ,, Sennæ . .	3 1–4
5. Syrups made from special preparations.	*a.* Syrupus Aurantii Floris (from Orange-flower Water) . . .	fl 3 1
	b. Syrupus Scillæ (from Vinegar of Squill) .	fl 3½–2
	c. Syrupus Tolutanus (from Balsam of Tolu) .	fl 3 1
6. Syrups containing Iron-salts.	*a.* Syrupus Ferri Iodidi = gr. 4·3 in fl 3 1 .	fl 3 ½–1
	b. Syrupus Ferri Phosphatis = gr. 1 in fl 3 1 .	fl 3 1

XXX. Tabellæ—Tablets.

Tabellæ Nitroglycerini = gr. $\frac{1}{100}$ in each .	1 or 2

XXXI. Tincturæ—Tinctures.

It is difficult to give any satisfactory classification of the many Officinal Tinctures, but the following arrangement may afford some aid in remembering them, as well as for purposes of reference.

A. Tinctures of Inorganic Drugs.

(Made with Rectified Spirit.)

	Dose.
Tinctura Ferri Acetatis	♏ 5–30
„ „ Perchloridi = 1 of Strong Solution of Perchloride in 4	♏ 10–30
Tinctura Iodi = 1 in 40. (Contains Iodide of Potassium)	♏ 5–20

B. Simple Alcoholic Tinctures of Vegetable Drugs.

(a) Made with Rectified Spirit.

1 in 2.	Tinctura Zingiberis Fortior	♏ 5–20
1 in $3\frac{1}{4}$.	„ Aurantii Recentis	ʒ 1–2
1 in 5.	„ Pyrethri.	
	„ Veratri Viridis	♏ 5–20
1 in 8.	„ Aconiti	♏ 5–15
	„ Asafœtidæ	ʒ $\frac{1}{2}$–1
	„ Cubebæ	ʒ $\frac{1}{2}$–2
	„ Laricis	♏ 20–30
	„ Myrrhæ	ʒ $\frac{1}{2}$–1
	„ Sumbul	♏ 10–30
	„ Tolutana	♏ 20–40
	„ Zingiberis	♏ 15–ʒ 1
1 in 10.	„ Kino (Glycerine and Distilled water also used)	ʒ $\frac{1}{2}$–2
1 in 20.	Tinctura Arnicæ	ʒ $\frac{1}{2}$–1
	„ Cannabis Indicæ. (Made with Extract)	♏ 5–20

		Dose.
1 in 27.	Tinctura Capsici . . .	♏ 10–20
	Tinctura Nucis Vomicæ = gr. 133 of Extract in O 1. (Distilled water also used) . . .	♏ 10–20
	Tinctura Podophylli = gr. 1 of Resin in fl. ʒ 1 . . .	♏ 15–fl ʒ 1

(*b*) *Made with Proof Spirit.*

1 in $4\frac{1}{2}$	Tinctura Ergotæ . . .	♏ 5–30
	,, Jaborandi . .	fl ʒ $\frac{1}{2}$–1
1 in 5.	,, Cinchonæ . .	fl ʒ $\frac{1}{2}$–2
1 in 8.	Tinctura Buchu . . .	fl ʒ 1–2
	,, Calumbæ . .	fl ʒ $\frac{1}{2}$–2
	,, Cascarillæ . .	fl ʒ $\frac{1}{2}$–2
	,, Catechu (contains Cinnamon). .	fl ʒ 1–2
	,, Chiratæ. . .	fl ʒ $\frac{1}{2}$–2
	,, Cimicifugæ . .	♏ 15–60
	,, Cinnamomi . .	fl ʒ $\frac{1}{2}$–2
	,, Colchici Seminum .	♏ 10–30
	,, Conii . . .	♏ 20–60
	,, Digitalis . .	♏ 10–30
	,, Gallæ . . .	fl ʒ $\frac{1}{2}$–2
	,, Gelsemii . .	♏ 5–20
	,, Hyoscyami . .	fl ʒ $\frac{1}{2}$–1
	,, Jalapæ . . .	fl ʒ $\frac{1}{2}$–2
	,, Krameriæ . .	fl ʒ $\frac{1}{2}$–2
	,, Limonis . .	fl ʒ $\frac{1}{2}$–2
	,, Lobeliæ . .	♏ 10–fl ʒ $\frac{1}{2}$
	,, Lupuli . . .	fl ʒ $\frac{1}{2}$–2
	,, Sabinæ . . .	♏ 20–fl ʒ 1
	,, Scillæ . . .	♏ 10–30
	,, Senegæ . . .	fl ʒ $\frac{1}{2}$–2
	,, Serpentariæ . .	fl ʒ $\frac{1}{2}$–2
	,, Stramonii . .	♏ 10–20
	,, Valerianæ . .	fl ʒ 1–2

		Dose.
1 in 10.	Tinctura Aurantii . . .	fl ʒ 1–2
1 in 13½.	Tinctura Opii . . .	♏ 5–40
1 in 20.	Tinctura Belladonnæ . . „ Croci . . .	♏ 5–20
1 in 27.	Tinctura Quassiæ . . .	fl ʒ ½–2
1 in 40.	Tinctura Aloes (contains Extract of Liquorice) . .	fl ʒ 1–2

C. Ammoniated Tinctures.

Aromatic Spirit of Ammonia.	Tinctura Guaiaci Ammoniata . .	fl ʒ ½–1
	Tinctura Valerianæ Ammoniata . .	fl ʒ ½–1
Strong Solution of Ammonia and Rectified Spirit.	Tinctura Opii Ammoniata = 1 in 96. (A Compound Tincture).	fl ʒ ½–1
Solution of Ammonia and Proof Spirit.	Tinctura Quininæ Ammoniata = gr. 1 in fl ʒ 1 . . .	fl ʒ ½–2

D. Tinctures made with Special Menstrua.

Tinctura Lobeliæ Ætherea, made with Spirit of Ether	♏ 10–fl ʒ ½
Tinctura Quininæ, made with Orange Wine = gr. 1 of Hydrochlorate in fl ʒ 1	fl ʒ ½–2

E. Compound Tinctures.

(*a*) *Made with Rectified Spirit.*

Tinctura Benzoini Composita . .	fl ʒ ½–1
„ Chloroformi Composita . .	♏ 20–60
„ „ et Morphinæ . .	♏ 5–10
„ Lavandulæ Composita . .	fl ʒ ½–2

(*b*) *Made with Proof Spirit.*

		Dose.
Tinctura	Camphoræ Composita. (Contains Opium = gr. 1 in fl ℥ ½)	♏ 15–fl ʒ 1
,,	Cardamomi Composita . .	fl ʒ ½–2
,,	Cinchonæ Composita . .	fl ʒ ½–2
,,	Gentianæ Composita . .	fl ʒ ½–2
,,	Rhei	fl ʒ 1–8
,,	Sennæ	fl ʒ 1–4

F. Tinctures of Animal Drugs.

Made with Proof Spirit.

Tinctura	Cantharidis	♏ 5–20
,,	Cocci	

XXXII. Trochisci—Lozenges.

1.	Trochisci	Acidi Benzoici = gr. ½ . .	1–5
2.	,,	,, Tannici = gr. ½	1–6
3.	,,	Bismuthi = gr. 2	
4.	,,	Catechu = gr. 1	
5.	,,	Ferri Redacti = gr. 1	
6.	,,	Ipecacuanhæ = gr. ¼ . .	1–3
7.	,,	Morphinæ = gr. $\frac{1}{36}$ of Hydrochlorate	1–6
8.	,,	Morphinæ et Ipecacuanhæ = gr. $\frac{1}{36}$ and $\frac{1}{12}$	
9.	,,	Opii = gr. $\frac{1}{10}$ of Extract	
10.	,,	Potassæ Chloratis = gr. 5	
11.	,,	Santonini = gr. 1	
12.	,,	Sodii Bicarbonatis = gr. 5	

XXXIII. Unguenta—Ointments.

For practical purposes the officinal ointments may be grouped thus :—

1. Unguentum Simplex, a mixture of Benzoated Lard, White Wax, and Almond Oil.

2. Containing Acids.
   - *a.* Unguentum Acidi Borici.
   - *b.* „ „ Carbolici.
   - *c.* „ „ Salicylici.

3. Containing Iodine or Iodides.
   - *a.* Unguentum Iodi (contains Iodide of Potassium).
   - *b.* „ Iodoformi.
   - *c.* „ Sulphuris Iodidi.
   - *d.* „ Hydrargyri Iodidi Rubri.
   - *e.* „ Plumbi Iodidi.
   - *f.* „ Potassii Iodidi.

4. Unguentum Antimonii Tartarati.

5. Containing Mercury or its compounds.
   - *a.* Unguentum Hydrargyri.
   - *b.* „ „ Compositum.
   - *c.* „ „ Oxidi Rubri.
   - *d.* „ „ Nitratis.
   - *e.* „ „ Nitratis Dilutum.
   - *f.* „ „ Iodidi Rubri (also mentioned under Iodides).
   - *g.* „ „ Subchloridi.
   - *h.* „ „ Ammoniati.

6. Containing compounds of Lead.
   - *a.* Unguentum Plumbi Acetatis.
   - *b.* „ „ Carbonatis.
   - *c.* „ „ Iodidi (also mentioned under Iodides).
   - *d.* Unguentum Glycerini Plumbi Subacetatis.

7. Containing compounds of Zinc.
   - *a.* Unguentum Calaminæ.
   - *b.* „ Zinci (Oxide of Zinc).
   - *c.* „ „ Oleati.

8. Containing Sulphur or a Sulphide.
   - *a.* Unguentum Sulphuris.
   - *b.* „ „ Iodidi (also mentioned under Iodides).
   - *c.* Unguentum Potassæ Sulphuratæ.

9. Containing parts of plants, or vegetable products or preparations.
   - *a.* Unguentum Belladonnæ, (Alcoholic Extract).
   - *b.* Unguentum Chrysarobini.
   - *c.* „ Elemi.
   - *d.* „ Eucalypti (Oil).
   - *e.* „ Gallæ.
   - *f.* „ Gallæ cum Opio.
   - *g.* „ Sabinæ.
   - *h.* „ Staphisagriæ.

10. Containing powerful Alkaloids.
   - *a.* Unguentum Aconitinæ
   - *b.* „ Atropinæ
   - *c.* „ Veratrinæ

   = gr. 8 in ℥ 1

11. Containing products of distillation of wood.
   - *a.* Unguentum Creasoti.
   - *b.* „ Picis Liquidæ.
   - *c.* „ Resinæ.
   - *d.* „ Terebinthinæ.

12. Containing Animal drugs.
   - *a.* Unguentum Cantharidis.
   - *b.* „ Cetacei.

XXXIV. Vapores—Inhalations.

1. Vapor Acidi Hydrocyanici = ♏ 10 to 15 of Acid with fl ʒ 1 of *cold* water.

2. Vapor Chlori. Made by moistening Chlorinated Lime with water.

3. Vapor Coninæ. Made with Juice of Hemlock, Solution of Potash, and Water.

4. Vapor Creasoti = ♏ 12 to fl ʒ 8 of *boiling* water.

5. Vapor Iodi = Tincture of Iodine, fl ʒ 1, with Water fl ℥ 1, heated gently.

6. Vapor Olei Pini Sylvestris. Made with Fir-wood Oil, ♏ 40, Light Carbonate of Magnesium, gr. 20, and Water.

XXXV. Vina—Wines.

		Dose.
1. Simple Wines	*a.* Vinum Aurantii.	
	b. „ Xericum.	
2. Wines containing inorganic drugs.	*a.* Vinum Antimoniale = gr. 2 of Tartarated Antimony in fl ʒ 1 . . .	♏ 5–fl ʒ 1
	b. Vinum Ferri . .	fl ʒ 1–4
	c. „ „ Citratis. (Made with Orange Wine) .	fl ʒ 1–4
3. Wines containing vegetable drugs.	*a.* Vinum Aloes . .	fl ʒ 1–2
	b. „ Colchici . .	♏ 10–30
	c. „ Ipecacuanhæ .	♏ 5–fl ʒ 6
	d. „ Opii (1 of Extract in 20) . .	♏ 10–40
	e. „ Quininæ. (Made with Orange Wine) = gr. 1 of Sulphate in fl ʒ 1	fl ʒ ½–1
	f. Vinum Rhei. (Contains Canella Bark.) . .	fl ʒ 1–2

APPENDIX.

THE B.P. gives a more or less detailed account in its *Appendix* of the different substances and solutions used for testing purposes. Anyone desiring fuller information on this subject must refer to the Pharmacopœia (p. 475 *et seq.*) ; but it may be worth while to enumerate here the agents which are thus officially recognised, and they may be grouped under the following divisions :—

I.—METALS.

1. *Copper Foil* = pure metallic copper, thin and bright.
2. *Fine Gold*, free from metallic impurities.
3. *Platinum*
   a. *Platinum Foil.*
   b. *Platinum Black*, in a state of minute division.
4. *Granulated Tin*, in small fragments.

II.—NON-METALLIC COMPOUNDS.

1. *Sulphuretted Hydrogen Gas.*
2. *Oxalic Acid* of commerce, not quite pure.

III.—METALLIC SALTS.

1. *Acetate of Sodium.*
2. *Chloride of Barium.*
3. *Ferricyanide of Potassium.*
4. *Hyposulphite of Sodium.*
5. *Oxalate of Ammonium.*
6. *Subacetate of Copper.*
7. *Sulphate of Copper*, anhydrous.
8. *Sulphide of Iron.*

IV.—Organic Substances.

1. *Benzol*, obtained from coal-tar.

2. *Benzolated Amylic Alcohol* = 3 to 1.

3. *Indigo*, a blue pigment obtained from various species of *Indigofera*, *N.O.* **Leguminosæ.**

4. *Isinglass.*

5. *Litmus*, a blue pigment prepared from various species of *Rocella*, *N.O.* **Lichenes.**

a. Litmus Paper { Blue. Red.

6. *Petroleum Spirit*, obtained from petroleum.

7. *Phenol-phthaleine.*
   a. Tincture.

8. *Turmeric*, the dried rhizome of *Curcuma Longa*, *N.O.* **Zingiberaceæ.**
   a. Turmeric Paper.
   b. Turmeric Tincture.

V. Test Solutions.

1. *Solution of Bromine* = ♏ 10 in fl ʒ 5.

2. *Solutions of Acids* { *a. Boric Acid.* *b. Tartaric Acid.*

3. *Solutions of Metallic Salts.*
   a. Acetate of Copper.
   b. „ „ *Potassium.*
   c. „ „ *Sodium.*
   d. Ammonio-Nitrate of Silver.
   e. Ammonio-Sulphate of Copper.
   f. „ „ „ *Magnesium.*
   g. Carbonate of Ammonium.

h. Chloride of Ammonium.
i. „ „ *Barium.*
j. Ferricyanide of Potassium.
k. Ferrocyanide of Potassium.
l. Iodide of Potassium.
m. Oxalate of Ammonium.
n. Perchloride of Gold.
o. „ „ *Platinum.*
p. Phosphate of Sodium.
q. Potassio-Mercuric Iodide.
r. Stannous Chloride.
s. Sulphate of Iron.
t. „ „ *Calcium.*
u. Sulphydrate of Ammonium.
v. Yellow Chromate of Potassium.

4. *Solutions of Organic Substances.*

a. Albumen, recently prepared.
b. Isinglass = gr. 50 in fl ℥ 5.
c. Litmus, for making papers.
d. Sulphate of Indigo. Indigo dissolved in sulphuric acid = gr. 5 in fl ℥ 10.

VI.—Volumetric Test Solutions.

1. *Bichromate of Potassium.*
2. *Hyposulphite of Sodium.*
3. *Iodine.* (Contains *Iodide of Potassium.*)
4. *Nitrate of Silver.*
5. *Oxalic Acid.*
6. *Soda.*

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